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## DUODENAL DIVERTICULA; THEIR SIGNIFICANCE AND TREATMENT

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**D**IVERTICULOSIS and diverticulitis of the small bowel have received a great deal of attention in the literature in the past few years, — I have reviewed more than one hundred articles on this subject which have appeared during the last ten years. These have dealt with the subject from the angle of medical man, surgeon, radiologist, pathologist, and anatomist. This would seem to indicate that the doctor, no matter what his specialty, is becoming more and more interested in and conscious of these abnormalities of the intestinal tract, which remain rare enough, however, still to furnish a mild thrill by their discovery. Couple with this their difficulty of diagnosis "in vivo," due to their at times bizarre and puzzling symptomatology, or, more likely, their almost total lack of recognizable symptoms, and we have a diagnostic problem which may rightly intrigue our professional skill and reasoning powers. On such a basis, and because I happen to have seen, comparatively recently, an unusual number of cases illustrating many phases of this interesting lesion, I have the temerity to speak to you on this subject.

It is not necessary to go extensively into the history of these lesions, or attempt a comprehensive review of the literature. Those who might wish to delve more fully into this aspect are referred to the bibliography appended. Rather would we spend our time considering their probable significance, both to doctor and patient. Are they of real pathologic or symptomatologic importance? Should they be considered a medical or surgical problem? Are they merely a relatively rare curiosity, whose presence is best ignored and disregarded, or should they be regarded seriously, either in the light of necessary operative treatment, or in regard to future prognosis?

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These are the aspects in which the patient is most interested, and which should therefore be of greatest concern to the conscientious doctor.

There have been several theories advanced to explain the formation of these pouches, all of which rest on three main foundational principles,—traction, pulsion, and congenital or developmental weak spots.

To exert traction on any point of the intestinal wall one would have to presuppose some connection, either normal or pathologic, between that area and some adjacent or surrounding structure which could apply an appreciable and fairly constant pull. This is rather difficult to visualize when one remembers that almost all of these diverticula originate on the mesenteric margin of the bowel and are often buried between the peritoneal leaves of that mesentery. In such a position they could not be much more effectually protected from external drag, though some observers argue that the pull could be applied by the mesenteric vessels themselves. These vessels, however, do not penetrate directly through to the mucosa, but usually traverse the muscular coat tangentially, so that any pull which might be exerted would be on this layer, not the mucosa. Then too, a fair number of duodenal diverticula are actually buried in the head of the pancreas, where it would seem traction would not only be utterly lacking, but rather the exact reverse, a support to the wall, would exist.

Pulsion presupposes a sufficient pressure within the bowel to force a partial herniation of the mucosa out through the muscularis, which entering wedge, by persistence of the internal pressure, becomes ballooned out to penetrate eventually the full thickness of the bowel wall, pushing the serosal coat ahead of it. Such an explanation seems somewhat more logical, except for the fact that only rarely does there seem to be any unusual dilatation of the bowel itself, which one might reasonably look for in increased intra-enteric pressure, and equally rarely is there any anatomic or organic obstruction which might cause such increased tension. In addition, diverticula usually occur in relatively old and debilitated individuals, in whom it is fair to suppose that the bowel musculature has lost some of its power and tone, so would hardly be producing pressures greater than normal within its lumen.

Congenital weak spots may precede the formation of the diverticulum, but when it is once present, would be almost impossible to demonstrate, and before the development of the pouch, could scarcely be recognized if looked for. Until they have given way to the extent of allowing something to protrude through them, they would be potential rather than actual. From analogy, however, we

know that wherever a vessel or other structure makes exit from the abdominal cavity, a potential weak spot exists, which may be spoken of as congenital, because it has been present since birth; to wit, the inguinal canal, the femoral canal, the umbilicus, and the esophageal hiatus. Viewed in this light the point of perforation of the bowel wall by every mesenteric vessel becomes one of lowered resistance, a potential weak spot, which could be developed as the muscle lost its tone.

I believe that almost all acquired diverticula of the bowel are formed by a combination of the two latter explanations, pulsion and congenital weak spots, with the main emphasis on the latter. This is in accord with Edward's views, as so graphically set forth in his description of the formation of jejunal diverticula. If we couple with this the known rhythmic contraction and relaxation of the bowel, and realize that during the phase of relaxation the channel of the vessel through the muscularis must be considerably widened, also that during the beginning of the phase of contraction, the intra-intestinal pressure must suddenly rise markedly before the bowel wall has contracted down sufficiently to close completely this weak spot thus established, then we are in a position to understand how a bleb of mucosa may herniate through this channel beside the vessel, and become the entering wedge in the development of the diverticulum. In addition, because of the almost constant close association of most duodenal diverticula with the head of the pancreas, and because embryologically that organ arises from buds from the primitive gut, and further because of the frequency with which accessory or aberrant pancreatic tissue occurs in or around the duodenal walls, it has been felt by some that these embryonic rests may well play a part in the etiology and development of duodenal diverticula. I have never been able to demonstrate, however, either grossly or microscopically, any evidence of pancreatic tissue in the walls of any of the diverticula which I have had an opportunity to examine, although it might be possible that all such aberrant tissue had been destroyed during the process of formation and subsequent development of the diverticulum. The validity of such an assumption does not void, however, the theory of *locus minoris resistentiae* of the entrance of the mesenteric vessels but rather adds an additional etiologic factor for consideration. No doubt some of the older theories such as pressure of fluid and gas, vascular congestion, connective tissue degeneration in the vascular walls, and degeneration of the muscular coat of the bowel may all play some part in the etiology at times. In fact, the circumstance that by far the greater number of these diverticula occur in older individuals, many of whom are, in addition, rather debili-

tated and decrepit, would definitely strengthen the feeling that some degenerative process played a real part in their etiology.

In the duodenum the diverticula occur almost invariably on the concave border,—which of course is the mesenteric border,—in close association with the head of the pancreas, the entrance of its duct into the bowel, and the ampulla of Vater. It is pretty generally felt now that real diverticula of the first portion rarely occur,—that what used to be looked upon as diverticula in this region, are usually ulcer niches or perforations, or are false pouching of the bowel wall just beyond the constriction of the pyloric muscle. There are apparently a few real diverticula reported, however, and I have seen at least two so situated. By far the largest number, probably over 75 per cent, occur in the second portion of the duodenum, almost always in intimate association with the head of the pancreas. In respect to this organ they may be pre-pancreatic,—these are apt to be the largest,—intra-pancreatic, which are the most common, and post-pancreatic,—the least common and the hardest to demonstrate. Due to the frequency with which they arise in the immediate vicinity of the insertion of the common duct, they were called by Letulle, "perivateriens." They may at times seriously encroach upon this structure, and by pressure, cause jaundice or transmit infection to pancreas or the bile tree and liver, or even, in extreme instances, produce an obstructive necrosis of the pancreas. Those diverticula occurring in the third portion of the duodenum present above the horizontal limb, also in the region of the head of the pancreas, more frequently behind than in front. Sometimes the superior mesenteric vessels may overlie a portion or all of the diverticulum, making it very difficult of access.

Duodenal diverticula are apt to be single, although a few cases have been reported showing two, three, four and even five separate sacs. Jejunal diverticula, on the other hand are much more apt to be multiple, the majority reported being in this group, and ranging in numbers up to several hundred. My experience coincides entirely.

The size of duodenal diverticula varies tremendously. Most of them will be somewhere between the size of a hazelnut and that of a pecan,—and somewhat the same shapes. However, occasionally one may be able to demonstrate a sac not more than half a centimeter in diameter, and equally rarely there may be one of large proportions,—as big as a good sized tangerine. The shape is usually globular ovoid, with a wide mouthed attachment to the bowel, but at times may be elongated, or irregular, almost multilocular, in outline.

There seems to be very little predilection as to sex among series of reported cases, although my own group shows a predominance of females,—almost two to one.

Most cases fall in the higher age groups, from 50 years up, with the decade from 60 to 70 furnishing the greatest numbers. The majority of my own cases have occurred in individuals over 60 years old.

As to actual frequency of occurrence of small intestinal diverticula, it is almost impossible to arrive at any accurate estimate. Unless they are searched for pretty carefully, any but the large and well developed sacculations may easily go unrecognized in the course of a routine autopsy. Conversely, if the person performing the postmortem is particularly interested in diverticula, he may allow his diligence in their discovery to color his findings to a certain degree, and every little semblance of a pouch or funnelling at a vessel becomes a diverticulum. Hence a marked disparity in the figures reported is noted and to be expected. X-rays are probably no more accurate, for there we must discount the results somewhat by the fact that no individual is apt to undergo a gastrointestinal x-ray examination unless there is some complaint which suggests the advisability of its performance. Hence we are getting no figures on normal, symptom-free individuals and therefore not a valid cross-section of the population. Add to this criticism the fact that unless the x-ray man is on the constant look out for diverticula they may easily be missed or obscured in the course of the ordinary examination, and we again have a most uncertain basis for any figures. For what the figures are worth, Rankin and Martin report 111 cases of duodenal diverticula in 72,715 examinations at the Mayo Clinic, 1927-1931; Dawson 36 in 2,250 consecutive gastrointestinal examinations; Beals, 41 in 1,887 consecutive cases; Case, 85 in 6,847 examinations. The further one progresses down the small bowel, the less apt is the barium meal to reveal diverticula under the x-ray. Taking all available figures it is probable that duodenal diverticula occur in between 1 and 1.5 per cent of adults, jejunal diverticula in not more than .2 per cent and ileal diverticula, exclusive of Meckel's, in such small number as to be statistically inexpressible. Van Noort lists diverticula in the order of frequency of their occurrence throughout the digestive tract as follows: 1, colon; 2, Meckel's; 3, duodenum; 4, pharynx and esophagus; 5, stomach; 6, jejunum; and 7, ileum. Not infrequently they occur in more than one division of the intestinal tract in the same individual. Less often they may be in conjunction with other congenital anomalies.

The incidence of infection in these small intestinal diverticula has been the subject of much debate among the contributors to the literature. By some it has been said that the safest position in the presence of a demonstrated diverticulum is not to blame it for any symptoms presented until every other cause can be ruled out. By

others it is contended that evidence of inflammatory reactions are much more frequent than usually credited and too often symptoms are blamed unjustly on other accompanying lesions. However, in a very careful histologic study of 122 cases of duodenal diverticula, Horton and Mueller found no evidence of present or previous inflammation either in the early small or older large sacs. In addition, there are very few reports of perforation of duodenal diverticula, although a number of authors report evidence, both gross and microscopic, of chronic or acute infection. Personally from my own experience I feel that diverticulitis is unusual, and perforation exceedingly rare. This may be due to the fact that these pouches, in distinction to those found in the large bowel, have rather wide mouths, and hence can empty easily. In spite of this fact, one occasionally encounters duodenal diverticula which will retain enough of the barium mixture to be visualized quite easily, after 24, and even 48, hours. In one, which was resected, there was microscopic evidence of chronic inflammation. Also the bowel content at these upper levels is virtually fluid, and the bacterial flora much less abundant and virulent. All of these facts probably contribute to the rarity of active inflammatory processes, but they do apparently occasionally occur.

When one comes to the point of considering the symptomatology of these diverticula, the picture is very hazy to say the least. Almost all of them are accidental discoveries either by the x-ray, at operation, or at the autopsy or dissecting room table. They apparently present, of themselves, no recognizable clinical picture. This may be due to the fact that they are really relatively asymptomatic; or that the trouble they give the patient is so vague and mild as to call for no complaint to the doctor, or suggest no pathologic entity to him if mentioned; or worse still, that they may be mixed up with some concomitant lesion so as to be indistinguishable from it. In the latter connection, it is of interest that with duodenal diverticula there are often associated gastric or duodenal ulcers, active or healed. The incidence of co-existing gallbladder disease is even higher, if one may judge from the figures in the literature and my own experience. There may also be an associated chronic pancreatitis, particularly if the sac be buried in that organ, or even a destructive necrosing pancreatitis, if pressure on that duct is sufficient. Scott feels that all duodenal diverticula will probably eventually cause some symptoms; they may, however, be vague and of the indistinguishable nagging type such as accompany chronic duodenal stasis from gastromesenteric ileus, or from a splenic or renal drag. The most constant symptomatology for duodenal diverticula seems to be as follows: Discomfort comes in attacks, without periodicity or any particular cycle connected with ingestion of food,

and often with long intervals of entire comfort between the attacks. The pain is usually characterized as marked fulness with heavy discomfort of a deep gnawing or boring quality, which does not go through to the back, but remains localized in the epigastrium. There is considerable gastric flatulence and belching, often accompanied by vomiting, but with comparatively little nausea. There is rarely hematemesis or melena. There is sometimes fairly marked anorexia, with rapid loss of weight. Occasionally there is some tendency toward diarrhea. There is frequently tenderness in the epigastrium, just to the right of the midline, and about half way from the level of the umbilicus to the costal margin. All of this is quite non-specific so far as a clearcut picture is concerned. I feel that probably more cases are symptomless than otherwise. In any event, I believe that it is impossible to make a diagnosis from history and physical examination alone. From the standpoint of laboratory aids, in a rather large number of cases there seems to be a hypoacidity,—or complete anacidity,—of the gastric juice; this of course would be in keeping with the high proportion of gall-bladder involvement, but seems also to exist in many cases where there is no evidence of biliary disease. There has occasionally been described a low calcium-phosphorus level in the blood, the significance or reason for which, is not clear, but is probably dependent upon damming of the pancreatic juice.

The x-ray following ingestion of barium really furnishes the only positive diagnostic aid. Here the examination must be done in a careful manner, keeping in mind the possibility of diverticulum, and taking every precaution to demonstrate one, if present. This should include repeated examinations over a period of several hours, in upright, supine and prone positions, with oblique and lateral views, as well as the usual anteroposterior ones. If this is not done, the shadow of the diverticulum may be superimposed upon and completely concealed by that of the barium-filled duodenum or pyloric antrum of the stomach. Compression of the transverse portion of the duodenum where it crosses the vertebral bodies, with mild retrograde massage may help to fill a duodenal diverticulum, otherwise difficult or impossible to demonstrate. Occasionally in the larger diverticula, viewed in the erect posture, a fluid level may be demonstrated, with superimposed air bubble. Care should be taken not to confuse the niche of a partially filled papilla of Vater with a small true diverticulum,—the former is apt to present a rather bifid tip, like the shadow of a calyx in the kidney, while the latter is globular or flask-shaped.

As for treatment, I question the advisability of surgery in most of these cases. The individual is usually of such age as to make operation wise only on definite or imperative grounds. Certainly

the mere presence of a demonstrable diverticulum is not sufficient reason, in view of the rarity of hemorrhage, active infection, or perforation, particularly where such operation may be technically difficult and extensive. I think it is much wiser to try a medical regimen based on bland food, plenty of fluids, antispasmodics, and gentle abdominal massage, reserving operation for those patients whose lack of response to such treatment, and physical complaints and disabilities warrant it. In evaluating these subjective symptoms, every effort should be made to eliminate the presence of some concomitant lesion which might be responsible for or at least contribute to the discomfort, rather than automatically to blame them on a known diverticulum. When operation is decided upon, resection of the sac is usually the wisest measure. Simple inversion, as advocated by some, is apt to encroach too much on the bowel lumen, and cause some obstructive symptoms. In those cases in which the sac is completely buried in the head of the pancreas, dissection of the entire sac may involve such extensive injury to that gland as to seem unwise. In three such instances we have opened the duodenum anteriorly after partially freeing it from its bed, as in the mobilization employed in a pyloroplasty, and then having located the opening of the diverticulum into the duodenum, cored out the mucosa of the sac, transduodenally, with a curet. The cavity remaining was then obliterated by several sutures of fine catgut, placed in the undisturbed submucosal and serosal layers of the sac, which sutures also controlled adequately the bloody ooze stirred up by such a procedure. A buried purse string suture was then placed around the neck of the sac, closing it completely, and the mucosal layer of the bowel brought together to cover all. The operation was completed by the closure of the incision in the anterior wall of the duodenum. This procedure has worked very well in the three cases in which we have used it, and has the additional advantage of making it possible to visualize the actual relationship with the ampulla of Vater, and thereby protect it, and the entering ducts, from too great encroachment or injury.

In any case where it is difficult to locate a buried diverticulum of the duodenum, at the time of operation,—and all too frequently this seems to be the fact,—the suggestion of Walzel rather appeals to me, though I have not as yet had occasion to try it. This consists in mobilizing the first and terminal third portions of the duodenum sufficiently to allow of the application of occluding rubber-shod clamps, and then distending the intervening diverticulum-bearing segment with air, by means of a syringe and small needle. In this way one might be able to locate and dissect free the sac, and ligate its neck without opening the bowel. Where the diverticulum is completely encased in the head of the pancreas, however, I be-

lieve the safest and less damaging intraduodenal treatment of the sac is better.

Since 1932 I have picked up 19 cases of diverticulosis of the duodenum, six of which showed more than one sac. Six cases were operated upon with two deaths. Both of these were in cases in which the sac was dissected out and resected. In one other case in which this same operative procedure was employed, the result was excellent. Three cases were subjected to the internal obliteration of the sac, described above, without mortality and with apparently permanently satisfactory result.

Briefly analyzing this series, we find:

In six instances, diverticula could be demonstrated in both duodenum and jejunum, and in four of these, as well as in several other cases, there were diverticula of the colon in addition.

The sex distribution was predominantly female, with the actual count for the whole group standing 12 to 7.

The youngest patient was 47, the oldest 78 when the diverticula were discovered. The average for the group was 63.7 years.

In six cases there was x-ray or operative evidence of a duodenal ulcer, active or healed. In three there were demonstrable gallstones, and in four others apparently definite evidence of gallbladder disease, past or present. In two of these a cholecystectomy for gallstones had previously been performed.

Three cases showed a complete anacidity, and five others acid in subnormal amount. In three there was a hyperacidity of noticeable degree.

There were two instances of intestinal hemorrhage otherwise unexplained,—in one of these the bleeding was quite extensive, and has not recurred following the operative obliteration of the sac.

In one case inflammatory adhesions to a very large jejunal sac produced an obstruction (found at autopsy), which was at least contributory to the death of the patient. In only one instance referred to above, was there any evidence, gross or microscopic, of inflammation of the duodenal diverticulum, in the six operative cases.

No real evidence of local irritation was observed, although in several cases marked irritability of the bowel, with abnormal peristalsis, was noted fluoroscopically. Also in the operative cases there seemed to be much more vomiting and distension than in the average stomach or bowel case, which coincides with Guthrie's experience in resection for jejunal diverticulosis. One of the two operative deaths seemed mainly dependent upon this factor as it

exhibited an intractable paralytic ileus with tremendous meteorism, although death seemed finally due to sensitivity to a drug administered in its attempted control.

The second operative death was directly due to another complication which may reasonably be feared when a sac is dissected from its intimate attachment to the head of the pancreas; namely, an immediately developing fatal hemorrhagic pancreatitis.

In conclusion, I feel that a majority of these lesions are of no particular pathologic significance, and should not alter the life expectancy of the individual patient as estimated on the other factors in their general physical condition. The diverticulum may produce some discomfort, but should rarely be considered to threaten life. In accord with this view, very few diverticula of the duodenum are of surgical significance.

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## ACUTE INTUSSUSCEPTION OF CHILDHOOD

### Its Relation to Mesenteric Lymphadenitis

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**I**NTUSSUSCEPTION may be divided into two groups. The first group is composed of those cases in which there is a definite causative agent such as intraluminal or extraluminal tumor, anatomic anomalies or Meckel's diverticulum. The second group is composed of those cases in which there is no demonstrable cause.

This communication is concerned with the second group. The term acute intussusception of childhood is used, in the limited sense, meaning that type of intussusception seen in childhood practically always in the first two years of life and most frequently seen between the third and eleventh months of life. It will be shown that in a very high percentage of these cases mesenteric lymphadenitis is an associated pathologic finding at operation. The term mesenteric lymphadenitis is also used in a limited sense meaning that idiopathic lymphadenitis so frequently seen in children and which Wilensky<sup>1</sup> has called "nonspecific" mesenteric lymphadenitis. In textbooks it is frequently called tabes mesenterica. For detailed information on this disease, the reader is referred to the publications of Wilensky.

In a recent study of sixteen consecutive cases of acute intussusception of childhood seen at the John Gaston Hospital between Jan. 1, 1935 and Jan. 1, 1941, it was found that mesenteric lymphadenitis was described as an associated disease in 7 or 43.75 per cent of the cases.

A summary of these cases follows:

**CASE 1.**—L. T., a negro girl 21 months old, was admitted to the hospital with a history of paroxysms of abdominal cramps and vomiting of 12 hours duration. She had had one bloody stool. Physical examination revealed a sausage shaped mass in the right abdomen which became firmer and moved along the course of the colon during each seizure of pain.

A diagnosis of acute intussusception was made. Upon opening the abdomen a reducible ileocolic intussusception was found and reduced. Mesenteric lymphadenitis was noted by the surgeon, but not described in detail.

The patient made an uneventful recovery and was discharged 10 days after the operation.

**CASE 2.**—B. P., a white child, 6 months old, was admitted to the John Gaston Hospital with a history of paroxysms of abdominal pain and vomiting of four hours duration. He had had one bloody stool prior to admission.

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There was a mass typical of intussusception which during an attack of pain could be palpated as it moved down into the left lower quadrant. The head of the intussusception could be palpated with a finger in the rectum during a painful seizure.

At operation a reducible ileocolic intussusception was found and reduced. Mesenteric lymphadenitis was noted.

The patient made an uneventful recovery and was discharged on the tenth day after operation.

**CASE 3.**—C. M., a white boy, 21 months old, was admitted to the hospital with a history of paroxysms of abdominal pain and vomoting of four hours duration. There was no history of bloody stool nor was there any blood in rectum. There was a mass typical of intussusception in the right abdomen. A diagnosis of intussusception was made and confirmed by the administration of barium per rectum and roentgen examination. The intussusception was reduced by a pressure of barium under fluoroscopic observation. However, after reduction in this way, a mass was still palpable in the right lower quadrant and it was questionable whether reduction had been complete. Consequently laparotomy was performed. Reduction had been complete, the terminal two inches of the ileum were swollen and edematous. The mass which was palpable before the abdomen was opened was found to be greatly enlarged mesenteric lymph nodes in the ileocolic angle. The abdomen was closed after exploration, and the patient made an uneventful recovery.

**CASE 4.**—L. W., a negro boy, 10 months old, was admitted to the hospital 26 hours after the onset of paroxysms of abdominal pain and vomiting. There was no history of bloody stools, but blood was found in the rectum at the time of the examination. A mass with the typical characteristics of an intussusception was palpable in the right side of the abdomen. At operation an ileocolic intussusception was found. Simple reduction was done. The presence of mesenteric lymphadenitis was noted.

Death from pneumonia occurred 48 hours after operation.

**CASE 5.**—B. W., a white child, 8 months old, was admitted after 7 hours of intermittent and severe abdominal pain and vomiting. He had had several small bloody stools. A mass typical of intussusception was found in the right abdomen. At operation an ileocolic intussusception was found. The appendix was involved in the intussusception and was gangrenous. Mesenteric lymphadenitis was noted. The intussusception was simply reduced and the gangrenous appendix removed.

Recovery was uneventful.

**CASE 6.**—A. H., negro, 12 months old, was admitted to the hospital after having had severe abdominal cramps and vomiting for 24 hours. He had had several bloody stools. No abdominal mass was palpated. At operation an ileocolic intussusception was found and the presence of mesenteric lymphadenitis noted. Simple reduction was done and recovery was uneventful.

**CASE 7.**—S. H., a negro infant, 4 months old, was admitted 12 hours after the acute onset of intestinal colic and vomiting. She had had repeated loose bloody stools. A mass typical of intussusception was palpable in the upper abdomen.

At operation a *colic* intussusception was found in the left half of the transverse colon. Reduction was done easily and after reduction a lymph node 1 cm. in diameter was found adherent to that portion of the wall of the gut which had been the head of the intussusception. The node was one of a group involved in mesenteric lymphadenitis. Recovery was complete and uneventful.

In the remaining 9 cases of the group no etiologic factor was described and there was no mention of having looked for a cause.

Statistics of the entire group are shown in Table.

#### COMMENT

It is true that a series of only 16 cases is not sufficiently large to make accurate statistical studies as far as mortality, age and sex incidence are concerned. However, the fact that intussusception and mesenteric lymphadenitis were associated in 43.75 per cent of the cases is significant. It becomes more significant when it is realized that this observation was made when no one was looking for the association of the two diseases and when the presence of mesenteric lymphadenitis was mentioned only as a passing observation. These 16 cases of intussusception were operated upon by six different surgeons who were with one exception residents in surgery. In short, the observation was made and recorded by a group of men inexperienced in observation and notoriously unschooled in the practice of meticulously recording all observations of pathology, irrelevant as they might seem at the time of the operation. It might, therefore, be inferred that 43.75 per cent does not represent the true incidence of the association of acute intussusception and mesenteric lymphadenitis and that the incidence is probably much higher.

Perrin and Lindsay<sup>2</sup> have shown that in children under two years of age the ileocecal valve is relatively longer than in adult life and it, as well as the mucosa of the terminal 4 to 6 inches of the ileum, is studded with masses of lymphoid tissue which completely surround the lumen of the gut. After their studies on 400 cases of intussusception and reviewing the literature they formulated the following theory to account for the majority of acute intussusceptions.

The determining factor is the production of the equivalent of a foreign body within the intestines. This foreign body is provided by the swelling of pre-existing lymphoid tissue. The anatomical and age distribution of the lymphoid tissue in the alimentary canal agrees exactly with the anatomical and age distribution of all primary intussusceptions.

This theory based upon anatomy is considerably strengthened by the observed relationship of intussusception and mesenteric lymphadenitis. It is further strengthened by the observation, repeatedly made at operation, that after reduction of an ileocolic intussusception, the terminal one to two inches of the ileum and the ileocecal

valve are edematous and firm, resembling a tumor. It has been previously supposed that this firm and edematous mass was the result rather than the cause of the intussusception. However, because of the observed relationship between intussusception and mesenteric lymphadenitis, it seems justifiable to assume that lymphoid hyperplasia of the terminal ileum existed first and as the "equivalent of a foreign body within the intestine" was the cause of the intussusception.

The disappearance of the excessive lymphoid tissue of the terminal ileum and the ileocecal valve after 2 years of age accounts for the rarity of intussusception in older children who are seen with mesenteric lymphadenitis.

Almost all of the acute intussusceptions of childhood are ileocecal, a fact which again lends credence to the importance of lymphoid hyperplasia as its cause. The one case of colic intussusception in the author's series (Case 7) is interesting for it demonstrates the mechanism by which lymphadenitis can produce intussusception of this type. There was marked mesenteric lymphadenitis present around the ileocecal region and up the right side of the posterior abdominal wall. There was an enlarged node adherent to the wall of the transverse colon just to the left of the midline and it was this point of the bowel which became the head of the intussusception. It has been frequently observed that extraluminal tumors adherent to the wall of the bowel may act as an intraluminal tumor does in precipitating an intussusception.

A complete review of the literature has failed to reveal any description of the association of mesenteric lymphadenitis and intussusception. One might question whether or not the lymphadenitis was secondary to the intussusception. That it is seems unlikely for frequently patients with intussusception are operated upon just a few hours after the onset of the intussusception, and it can hardly be reasoned that the regional lymph nodes enlarge that rapidly. In Case 3, here reported, the intussusception was only four hours old, but the lymph nodes in the ileocolic angle were so large that they could be palpated through the abdominal wall after complete reduction of the intussusception by barium enema. Such an enlargement of lymph nodes could hardly have occurred in four hours.

#### CONCLUSIONS

In a series of 16 consecutive cases of acute intussusceptions of childhood 7, or 43.75 per cent were associated with mesenteric lymphadenitis. Since the coexistence of mesenteric lymphadenitis was noted by several different surgeons with no idea of the corre-

lation of the two supposedly different entities it justly is concluded that the coexistence is much higher than 43.75 per cent.

That mesenteric lymphadenitis may play an important etiologic role in acute intussusception is evident.

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## POSTOPERATIVE COMPLICATIONS

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**W**HILE improvement in operative technic has greatly lowered the mortality and morbidity of the surgical patient, better preoperative and postoperative care is undoubtedly the most important factor in the improved end results now obtained. This in turn has been due to many studies of the abnormal physiology, and chemistry of surgical disease and their complications which have led to a better chance of survival and to a shorter and more comfortable convalescence.

The subject of postoperative complications covers such a wide field that in the limits of this paper we can consider only the most common complications, and these, in a very brief fashion. In discussing postoperative complications, we must remember that they are greatly influenced by preoperative treatment. Of many examples, we might list a few: The giving of proper sedation, iodides, and a high caloric diet before thyroidectomy lessens the number of thyroid crises. Better postoperative results are also seen in the following with more careful preoperative care: Restoring blood chlorides and protein and giving vitamins, hydrochloric acid and gastric lavages in gastric cases; the preoperative decompression of the colon and small bowel in low grade colonic obstruction with proper diet and mild catharsis, as in the Miles regime; or with gastro-duodenal suction, the Miller-Abbott tube or cecostomy in cases of high grade colonic obstruction. In any laparotomy, bringing the blood ascorbic acid and serum protein to normal are prerequisites for good wound healing. Restoring the water and electrolytic balance to its proper level is essential in all operative cases, while giving vitamin K when indicated will prevent postoperative hemorrhage if jaundice is present. A better convalescence follows cholecystectomy if the patient has been on a high carbohydrate, high protein and low fat diet.

In dealing with postoperative complications we can consider them by systems.

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## PULMONARY COMPLICATIONS

With the exception of the wound, the lungs are the most frequent site of postoperative complications.<sup>66</sup> These may be of any type but commonly there will occur atelectasis (1-5 days postoperatively), pneumonia (5-8 days postoperatively), and pulmonary emboli (eighth day on).<sup>55</sup> The latter will be considered under cardiovascular complications. Postoperative pneumonia is now generally regarded as a sequel to an atelectasis in nearly all cases, the atelectasis resulting from excessive pulmonary secretions with a decrease in the ability to get rid of these. Plugging of the bronchus then occurs with a collapse of a greater or lesser area of the lung. Much may be done before operation to minimize these serious complications. The patient should be carefully checked for signs of upper respiratory infections and pulmonary disease before operation. X-ray examination in doubtful cases is of great value. In our clinic routine, micro-x-ray films of the chest on all patients are made and seem worth while as they have revealed many unsuspected lesions. If time allows, the teeth should be cleaned when necessary by proper dental hygiene. Preoperative medications such as morphine, which diminishes the cough reflex, and atropine, which increases the viscosity of the secretions, should be administered intelligently, as overdoses will make it difficult to raise the sputum. Elderly patients should be kept ambulatory as much as possible before operation. Adequate treatment of patients with asthma, bronchiectasis and cardiac insufficiency is especially important.

The anesthetic used and the method of administration should be such that the patient is able to respond soon after the operation is over. Avertin, which is such a good basal anesthetic, should never be given in such amounts which might cause the patient to sleep for long hours after operation.

The stomach should be empty before general anesthesia. If vomitus should be aspirated during operation, the patient should be bronchoscoped on the spot and the material removed. At the conclusion of the operation, the pharynx and trachea must be dry and, if secretions are present, they must be removed by catheter suction or by bronchoscopic aspiration.<sup>40</sup> If the operation is such that there is danger of material getting down into the tracheobronchial tree, intubation anesthesia should be used. Burford<sup>66</sup> believes that pneumonitis is as common after spinal as after inhalation anesthesia, but Ferguson<sup>28</sup> finds fewer pulmonary complications when spinal anesthesia is used.

After operation, the patient should be encouraged to cough often with the abdomen supported to lessen pain and strain on the operative wound. He should likewise attempt to breathe deeply at

frequent intervals. Since pain from the incision after abdominal operations causes a 59 per cent depression of vital capacity by a reflex inhibition of respiration, Zollinger<sup>74</sup> has recommended blocking the fifth to the eleventh intercostal nerves with eucupin solution in oil. He found that this decreases pain and increases the vital capacity. The use of transverse incisions in the upper abdomen also makes breathing easier. The inhalations of a mixture of 15 per cent carbon dioxide and 85 per cent oxygen or rebreathing air into a paper bag, will stimulate deep breathing. The frequent turning of the patient from side to side will increase aeration and promote dependent drainage of the upper lung. The Trendelburg position is of value in promoting drainage from the trachea and lower lobe bronchi and should be used after operations on the upper abdomen until the cough reflex is active and efficient. When the pulmonary secretions are tenacious and viscid, steam inhalations containing menthol or benzoin will aid in expectoration, and expectorants such as ammonium chloride and ipecac will thin the secretions and make them easier to raise.

The early discovery and treatment of atelectasis before pneumonia can develop is important. Repeated examinations of the chest should be made for several days after the operation. If atelectasis is discovered and deep breathing with coughing can neither expand the lung nor expel the profuse secretions, a soft rubber catheter may be introduced into the trachea by way of the nostril and an attempt made thus to aspirate the secretions. The right and left main stem bronchi may be aspirated at will by using the maneuver of Haight, that is by turning the head sharply to one side, the catheter enters the main bronchus on the other side. Application of a local anesthetic to the pharynx is sometimes necessary. If not relieved by these procedures, the patient should be bronchoscopyed and the obstruction removed under direct inspection.

Artificial pneumothorax may be an effective measure in massive atelectasis, but as yet, has not been widely accepted.<sup>53</sup> Atelectasis following operations on the kidney is not a rare complication and occurs more frequently than reports in the literature would indicate. It always appears on the side opposite to that operated upon. The difficult position of the patient on the elevated kidney rest is evidently the direct exciting factor as respirations are decreased on the affected side.<sup>59</sup>

If pneumonia intervenes, it is treated like any other pneumonitis with chemotherapy playing an important part.<sup>67</sup> Attempts to prevent postoperative pneumonia with respiratory vaccines have been unsuccessful.<sup>69</sup>

## CARDIOVASCULAR COMPLICATIONS

As in all postoperative care, the management of the surgical patient with heart disease is dependent upon a sound preoperative preparation. Aside from certain cases of existing myocardial infarction or other organic heart disease with uncorrected failure, most cardiac patients can be conditioned to withstand major surgical procedures. In the patient with angina pectoris or with electrocardiographic evidence of past infarction, only the direct emergency is an indication for operation as the myocardium is in a more or less constant state of anoxia and any further anoxia precipitated by an anesthetic or slowing of the circulation may cause a terminal infarction. Auricular fibrillation and flutter are particularly deserving of digitalization for a sufficient time preoperatively to establish equilibrium. Digitalis, however, should not be used indiscriminately for it has been proven that it decreases the efficiency of the normal heart. Electrocardiograms should be taken preoperatively when the status of the heart is in doubt. Extra systoles and murmurs without evidence of organic heart disease are not in themselves contraindications to operation. At the University Hospital, where so many of our patients are in the advanced age group, we have had occasion to operate upon patients with every conceivable type of heart disease; and aside from the contraindications mentioned before, we have found the great majority of cardiac patients can be operated upon successfully if adequately prepared and properly treated postoperatively. The arteriosclerotic and hypertensive groups of heart disease are particularly responsive to preoperative rest, sedation, and other general measures. The danger in compensated cardiac cases lies in their inability to handle other complications that occur in the convalescent period. The preoperative care of these cases resolves into the maintenance of a normal circulation. Even mild degrees of shock are poorly tolerated by a patient with heart disease, for he does not have the cardiac reserve necessary to compensate for peripheral failure. In those individuals requiring it, digitalization should be maintained using parenteral injections if necessary. Recognition of the early signs of peripheral failure is imperative so that shock treatment can be started at once. Maintenance of normal preoperative blood pressure as well as blood volume, is of great importance. For example, shock may be treated with intravenous fluids up to a certain point with return of normal blood pressure, but if the venous volume is increased more rapidly than the right side of the heart can dispose of it, congestive failure may result.

Shock is a very extensive subject and our discussion of it here must be limited. To prevent shock, blood and fluid loss should be

replaced, at the operating table, if severe, and daily fluid and electrolyte balance maintained with the use of intravenous fluids computed to meet the daily requirements. The hypotension produced by spinal anesthesia is combated by giving neosynephrin or ephedrine. Body heat and the control of pain should be maintained postoperatively. Recent experiments show that the Trendelenburg position has little or no influence on the decreased blood pressure seen in shock.<sup>58</sup> In oncoming shock or shock already present, morphine, ephedrine, oxygen,<sup>61</sup> and heat should be used, together with intravenous blood or plasma, blood being more desirable in shock for hemorrhage. Blood serum may be used in place of plasma.<sup>58</sup> Pituitrin given intravenously before the transfusion, is said to enhance its effect. In shock arising from wounds of the lower extremities, low spinal anesthesia has been found to be of value as certain afferent impulses, which help maintain the shock, as well as pain, are blocked.<sup>13</sup>

Postoperative venous thrombosis has been estimated to occur in 1 to 7.5 per cent of cases.<sup>6,57</sup> These originate according to most of the modern investigators chiefly in the small veins of the leg, mainly in the calf.<sup>29,44</sup> Evidences of inflammation with a definite thrombophlebitis are seen in some cases. In others, there are no external signs; the condition may never be detected by ordinary clinical means. Among the many contributing factors in thrombosis, stasis of the venous circulation is the most important. Accordingly, most preventive measures are aimed at stimulating the peripheral circulation. The patient should be encouraged to move his legs in bed often. DeTakats<sup>26</sup> recommends attaching adjustable bicycle pedals to the foot of the bed for this purpose. The period of rest in bed after operation should be reduced to the safest minimum time.

Various positions in bed have been recommended but unfortunately, there are two opposing views on this subject. DeTakats<sup>26</sup> thinks that by placing the patient in a modified Trendelenburg position, the venous flow from the legs is encouraged. However, Trypholin<sup>52</sup> believes that collapse of the small veins in the legs occurs with the patient in bed resulting in injury to the walls of the veins through the trauma of contact and from nutritional disturbance. He therefore advocates raising the head of the bed for several hours each day in order to increase the pressure in the small veins.

Hemoconcentration in dehydration and shock aid thrombosis so these conditions should be corrected by restoring fluid balance and serum protein.<sup>28</sup> Heparin will prevent thrombosis but because of the expense and the difficulties in administrating, its use prophylactically must be limited to cases where there is a definite tendency for clotting to occur such as in vascular surgery.<sup>37, 21, 73</sup>

Among other measures used to prevent thrombosis are gentle handling of tissues, careful hemostasis and asepsis at the operating table, and avoiding prolonged intravenous therapy at the same site of injection. The administration of thyroid extract both preoperatively and postoperatively to speed up the rate of blood flow, is valuable. Smith and Allen<sup>64</sup> have shown that after operation, the circulation time from foot to carotid sinus is usually increased after the fourth day (the blood flows more slowly). This slowing may be prevented and even speeded up as shown by their experiments. The preoperative correction of anemia, adequate treatment of heart disease, varicosities, and hypervitaminosis has also been recommended.<sup>3</sup> Early recognition of venous thrombosis by taking repeated leg measurements in order to detect swelling, has been recommended by Culp.<sup>22</sup>

Bauer<sup>4,5</sup> has introduced a new technic of venography where, by injecting diodrast into the short saphenous vein of the leg, he can demonstrate x-ray changes diagnostic of thrombosis in early cases before the true clinical picture has appeared. In those cases where the thrombosis has not extended up into the femoral vein, heparin is indicated as it prevents the spread of the process and after several days the thrombophlebitis has regressed. When a recognizable thrombophlebitis is present, heat to the part with rest and elevation is indicated. Ochsner<sup>52</sup> and others have advocated lumbar sympathetic nerve block with novocain. The rationale of this treatment is that thrombophlebitis in a given vein in the leg, through local irritation, sets up a reflex arc with resulting constriction of all vessels to the affected extremity. This vasoconstriction not only produces venous stasis but affects capillary permeability with a resultant increase in lymphedema. This form of treatment is now routine at the University Hospital and the results have been excellent.

Improvement in cases of thrombophlebitis have been reported after intermittent venous occlusion in the lower extremity by means of a rubber cuff inflated to 70-80 mm. of pressure. This was applied in four minute cycles with two minutes of inflation and two minutes of deflation continued for three or four hours a day.<sup>5</sup>

Sodium thiosulphate given intravenously is said to lower the clotting time and seems to reduce the severity of the phlebitis. Leeches applied to the patient, occasionally lengthen the coagulation time but are a great nuisance. X-ray therapy has been reported to be of value when a systemic and periphlebitic reaction was present after the acute phase. The application of a Una glycercine gelatine cast from toes to groin for three weeks, has been recommended.<sup>25</sup>

Pulmonary emboli result as sequelae from venous thrombosis. A portion of the thrombus becomes detached and is carried to the lungs. This is more apt to occur in the milder cases of thrombosis because where there is a great deal of inflammation present, the thrombus will be more firmly attached. The preventive treatment of emboli is to keep thrombosis from occurring. If this occurs, some think keeping the patient at rest is important as the chance of dislodgment of the thrombus will be lessened. Others believe, however, that this only encourages additional thrombosis. Recently it has been advocated that ligation of the femoral vein above or below the profunda should be done in cases of thrombosis of the veins of the lower extremities as the deeper veins of the lower legs are the focus of origin of the great majority of pulmonary emboli.<sup>29</sup> One in three cases of phlebitis will have emboli. Ligation of the femoral vein is more important in patients over 50 years of age as the initial infarct is more apt to be fatal. Since one embolus is often followed by another more serious one,<sup>7</sup> ligation is especially indicated after infarction. Venography should be used in doubtful cases of thrombophlebitis and to search for thrombosis if a pulmonary embolus occurs without clinical evidence of trouble in the legs.<sup>72</sup> Since pulmonary embolism may occur from superficial vein thrombosis, ligation of the long saphenous vein has been advocated if it is involved. High ligation has also been suggested before the injection treatment of varicose veins for similar reasons.

After a pulmonary embolus has occurred, 100 per cent oxygen, preferably by the Boothby mask, papaverine (gr.  $\frac{1}{2}$ ), atropine (gr.  $1/60$ ), and intravenous heparin may be administered.<sup>20</sup> To prevent radiation of autonomic reflexes originating in the lungs which might contribute to the death of the patient, injection of the stellate ganglion with procaine has been advocated.<sup>66</sup> Recent experiments on animals, however, do not support the theory of reflex coronary vasospasm as a cause of sudden death, since mechanical factors are enough to explain the possible changes in coronary circulation.<sup>46</sup> Embolectomy has saved comparatively fewer lives and has proven a failure in most hands.

#### GENITO-URINARY COMPLICATIONS

Urinary retention together with the infection that is associated with it in many cases, is our main concern here. Inadequate output in the absence of renal disease should not occur if the patient's fluid and electrolyte balance has been taken care of. If the patient is unable to take fluids by mouth, enough parenteral fluids should be given so that the daily urinary output is at least 1000 c.c. with a specific gravity of not more than 1.015.

The causes of postoperative urinary retention may be divided into three groups:

1. Organic nerve disorders.
2. Mechanical obstruction and
3. Psychic suppression.

Under the first group, one must consider factors which interfere with either the afferent or efferent nerves of the bladder. This does not necessarily mean actual severance of nerve continuity but may be due to trauma or inflammation in the vicinity, especially in pelvic operations. Spinal anesthesia is another important contributing factor, but its effect is usually transitory. Our treatment of this type of urinary retention is inlying catheter drainage until nervous control is regained. Intermittent catheterization subjects the patient to needless discomfort and the danger of urinary infection is no greater with an inlying catheter than with repeated catheterization. If a patient fails to void spontaneously after three or four episodes of being catheterized, we usually place him on continuous catheter drainage with intermittent boric acid bladder irrigations every two to three hours. Once a patient has been catheterized or has been on continuous catheterization and then starts to void spontaneously, it is important to check him for residual urine by recatheterization if there is any doubt about the bladder emptying completely. Any patient who has an indwelling catheter is potentially infected and should be treated with urinary antiseptics. At the University Hospital, sulfathiazole or sulfadiazine, two grams per day, are given prophylactically to patients with indwelling catheters.

There are a number of drugs that have been advocated to stimulate the motor nerves of the bladder. Prostigmine is the one most commonly used. In our urologic clinic, a carefully controlled small series in which prostigmine was given failed to show any great benefit from the drug. These studies are being continued. Better results have been obtained elsewhere.<sup>50</sup> This and allied drugs should not be used after bowel anastomoses as they produce an increase of peristalsis.

Mechanical obstruction as a cause of urinary retention is seen most frequently in prostatic hypertrophy, cystocele and urethrocele. Inlying catheter drainage with intermittent boric acid bladder irrigations is almost a necessity in this group of patients until they become ambulatory or until they have the disturbed anatomy corrected by a subsequent operation. Here again, after removal of the inlying catheter, close attention to residual urine and the treatment of infection is of the utmost importance. An individual with prostatic hypertrophy may be compensated in the ambulatory state only to develop retention with the recumbency following an operation.

Psychic urinary suppression calls for considerable judgment on the part of the surgeon for, while catheterization is to be avoided if possible, gross distention should never be permitted. Pain from an abdominal incision may be a factor. This may be combated with morphine, but not in such doses that the sedation itself will interfere with voiding. Simple measures such as solitude, running water, warm perineal irrigations, meatal irritation with peppermint water, and the sitting position should be tried before catheterization is attempted. With the use of anatomic incisions, the patient may be allowed to stand up with support beside his bed if necessary, in uncomplicated cases. If all these measures fail, the patient should be catheterized with strict attention to asepsis and an ounce of mild antiseptic instilled before the catheter is withdrawn.

#### ABDOMINAL COMPLICATIONS

Under this heading only postoperative abdominal distention and peritonitis will be considered. In dealing with the former, the scope of this paper does not permit a consideration of paralytic ileus or mechanical obstruction as causes of abdominal distention. So-called functional ileus or "gas pains" is the most common abdominal complication following operation, and may cause a great deal of discomfort. The distention may be a contributing factor in other post-operative complications such as increasing venous stasis in the lower extremities and encouraging thrombosis. Associated vomiting can result in dehydration and alkaloisis, and the decrease respiratory excursion increases the incidence of atelectasis.

The pain suffered from distention is due to forceful peristaltic waves and the stretching of the bowel wall. The gases of the distended bowel consist mainly of swallowed air. Among the measures suggested to prevent distention are a low residue diet before operation with avoidance of cathartics and enemas during the twelve hours preceding operation. In abdominal operations, the viscera should be handled as carefully as possible. After operation, the patient should be turned frequently. Fluids and food by mouth should not be given too soon after the operation depending on the nature of the procedure, as fluids can be given parenterally and the absence of food for several days is not important in the average case. A high carbohydrate diet including the fermentable sugars should be avoided. Some recommend the use of Wangensteen suction prophylactically after every abdominal operation as distention does not occur after such a routine.<sup>63</sup>

In the active treatment of abdominal distention, heat with or without a rectal tube has been recommended. If the distention is not relieved by simple measures and, especially if vomiting is as-

sociated, Wangensteen suction should be instituted before the distention becomes too marked.<sup>71</sup> Morphine is of value to relieve the cramping pain. Also on theoretical grounds, it increases the tone of the bowel musculature and aids peristalsis. In our postoperative splanchnicectomies, atropine is usually effective in controlling the painful abdominal distention that may result. Pitressin is generally effective in evacuating the large bowel and stimulates the small bowel in varying degrees. Prostigmine has been reported to give good results when used prophylactically.<sup>34</sup> After distention has occurred, the relief obtained is unconstant. The stimulating action of these drugs on smooth muscle contraindicates their use in peritonitis and in intestinal anastomoses.

The inhalation of high concentrations of oxygen has been found to be effective in relieving distention.<sup>54</sup> Nitrogen, which comes from swallowed air and by diffusion from the blood stream, is the major factor in causing distention of the bowel as it is not readily absorbed as are most of the other intestinal gases. Ninety-five per cent oxygen inhalations by the Boothby mask,<sup>12</sup> aids in the absorption of nitrogen from the gut by prevention of the inhalation of nitrogen in the inspired air. As nitrogen is lost in the expired air, it diffuses out of the blood thereby desaturating the tissues and body cavities. In giving high concentrations of oxygen, care must be taken to avoid overdoses, as oxygen poisoning may result with pulmonary congestion, right heart failure, and liver congestion.<sup>55</sup> This can be prevented by not administering concentrated oxygen over too long a period of time.<sup>56</sup>

Peritonitis is the most common of the serious postoperative abdominal complications and occurs most frequently after operations on the gastrointestinal tract, the incidence increasing as the point of operation decends along the bowel. The decrease in the incidence of this complication is due for the most part to improvement in preoperative preparation. Chemotherapy, using sulfanilamide and sulfathiazol locally at operation and parenterally afterwards, has helped prevent and lower the mortality of peritonitis.<sup>47, 55, 56</sup> Operative interference should be limited, after the patient is in the proper physical condition, to the removal of foci of infection which are still causing contamination, and the drainage of abscesses. Drainage should be instituted without entering the free peritoneal cavity.<sup>19</sup>

#### GENERAL CONSIDERATIONS

Besides special attention to the various systems, the patient's general care must be considered. The importance of maintaining water and electrolyte balance can again be emphasized. Simple operative procedures in which a patient approaches operation in good

health, and following which, the oral administration of fluids need not be delayed for more than a few hours, present no problem. If a patient is in balance without excessive sweating or loss from the gastrointestinal tract by vomiting, diarrhea, or fistula, the daily administration of 500 c.c. normal saline solution or Ringer's solution intravenously, will maintain the blood chloride at normal level. Loss of fluid from the alimentary tract by vomiting, Wangensteen drainage, fistula, etc., should be replaced in equal amounts with normal saline. The rest of the fluid needed for maintaining hydration should be given as 5 per cent glucose, 3000-4000 c.c. for the twenty-four hour period. The urinary output should reach 1000 c.c. per day with a specific gravity not greater than 1.015.<sup>16,17</sup>

The importance of vitamin therapy should be considered from the surgical standpoint.<sup>51,36</sup> Vitamin A is necessary for a normal respiratory mucosa which is directly concerned with postoperative pulmonary complications. Loss of the tracheal cilia retards expectoration of secretions and abnormal regeneration of tracheobronchial mucosa lowers the resistance to infection. Vitamin B is important surgically because a deficiency here results in a painful tongue and mouth interfering with nutrition, beside the systemic effects including lowering resistance to infection. Vitamin C plays a fundamental part in wound healing, resistance and localization of infection. It does this by virtue of its role in the formation of intracellular cement which consists in part of collagen. Collagenous fibers, essential to firm wound healing and scar tissue formation also aid in walling off infections. Extreme vitamin C deficiency, manifested in scurvy, is serious because of the hemorrhagic tendency which may involve any organ. The bleeding spongy gums increase the hazard of lung abscess. Vitamin D which is concerned with calcium metabolism, is important in the healing of fractures as well as resistance to infection. Vitamin K is the one vitamin that is a specific.<sup>15</sup> The bleeding in jaundiced patients is due to a decrease in the blood level of prothrombin. Normal absorption of vitamin K, which is essential to the liver synthesis of prothrombin, takes place only in the presence of bile in the intestine. Abnormally long blood prothrombin clotting times can be remedied with the use of vitamin K and bile salts. Vitamin K can be given parenterally if necessary.

Hypoproteinemia results in the increase in the incidence of pulmonary complications and poor wound healing because of edema and a retardation of fibroblastic proliferation. This is apt to be present in many poorly nourished surgical patients. When a high protein diet cannot be taken orally, as in pyloric obstruction, the preoperative restoration of normal plasma protein levels must be obtained by the parenteral route. This can be accomplished with

blood transfusions or with plasma and lyophile serum if the hemoglobin of the patient is normal. After gastroenterostomy, the use of the Abbott-Rawsom double barrelled gastroenterostomy tube has proven very satisfactory.<sup>1,2</sup> The short component of the tube remains in the stomach for Wangensteen suction while the long component passes into the jejunum for a distance of 10 or 12 cm. and through this tube a high protein formula can be given immediately after operation.

Jejunostomies are recommended by many to properly nourish the patient if he is unable to take food by mouth over a long period of time.<sup>53</sup>

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## THE IMPORTANCE OF PRESERVING THE PHYSIOLOGIC FUNCTIONS OF THE NOSE IN INTRANASAL SURGERY

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THE functions of the nose may be classified as follows:

1. Airways: the inspired air is warmed, moistened and filtered.
2. Olfaction.
3. Resonance; quality or timber is added to the voice.
4. Aeration; the sinuses and middle ears are ventilated.
5. Immunization; repeated local infections build up generalized immunity.

Proetz speaks of self-cleaning which may be added.

In studying the history of nasal surgery it is clear that little attention was given the physiologic functions of the nose other than that it was a passageway for the air in respiration. Looking at the nose from this viewpoint surgery was performed to relieve nasal obstruction and to drain infected sinuses. Spurs were sawed off and turbinates removed, but such procedures seldom cured infected sinuses or made the patient more comfortable.

In 1912 Dr. Lewis A. Coffin, in 1914 Dr. H. P. Mosher, and in 1916 Dr. Greenfield Sluder described operations in which the ethmoid was plowed into with a curet and the middle turbinate removed. Following the introduction of these operations there was a wave of intranasal operations. Many of the operators throughout the country were untrained or had had a six weeks' course. Such operations had a mortality list and many poor results. No wonder the profession as a whole and the laity were saying "Once a sinus infection, always a sinus infection," or, "One nasal operation leads to another."\*

As Dr. Sidney Yankauer wrote in the *Laryngoscope*, September, 1930, "The curet is a crude and inefficient instrument incapable of anything but rough operative procedure." The effect of the rough curet method on the delicate mucous membrane of the nose is to be contrasted with the clean-cutting, biting operations shown in the illustrations.

I took my training at the Eye and Ear Infirmary in Boston in 1916-17. I took also that excellent course in anatomy given by the

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Dr. Reaves died on April 25, 1942.

great teacher Dr. H. P. Mosher—the man who could get more work out of his students than anyone I know. I did my first few ethmoid operations following Mosher's technic. I soon observed that the curet was crude and did not cut clean, often tearing the mucosa and leaving spicules of bone loose or attached. The post-operative field was left favorable for formation of granulations and reinfections. I soon discarded the curet when I found my brother Dr. W. P. Reaves, of Greensboro, N. C., getting much better results by the use of biting instruments, thereby doing much less damage to the remaining mucosa.

In 1924 Dr. John A. Pratt read a paper before the American Medical Association on "The Present Status of Intranasal Ethmoid Operations." Pratt advocated doing the operations without removing the middle turbinate in order to preserve the physiologic function and to lower the incidence of meningitis. It was, and still is, believed that injury to the mucosa in the olfactory region increases the danger of meningitis. Pratt was using the curet, working from the front backward. His paper caused me to become more conservative so that I began to remove only part of the middle turbinate until 1935 when I began to operate leaving all of the middle turbinate most of the time.

I have recently read Dr. Arthur W. Proetz' book on Applied Physiology of the Nose. I wish to congratulate him on a masterpiece well done. I hope all the otolaryngologists have read or will read this book.

#### TECHNIC OF OPERATING

1. Before advising an operation make the proper diagnosis in the following manner:

- A. Careful and complete history.
- B. Careful clinical examination.
- C. Laboratory aid and x-ray findings.
- D. Consultation with the internist and the allergist when necessary.

It is sometimes necessary to examine the patient more than once before making a correct diagnosis. Irrigating the antrum and the sphenoid when possible will often give positive evidence. It may be necessary to use lipiodol and make further x-ray studies. It is often wise to treat the patient for a while to see what response you may get. Sometimes the condition will clear up without operation. If it does not clear up you will often improve the condition to an extent that it will make the operation much easier.

2. Preoperative preparation: I prefer to pack the nose using a little 10 per cent cocaine with 2 or 3 drops of epinephrine on a thin strip of cotton extending from the sphenoid up through the olfactory fissure to the anterior part of the nose. After doing this I pack the nose with cotton saturated with 1 per cent butyn and 1 per cent ephedrine with a few drops of epinephrine added. The patient is then given 3 grains of nembutal on an empty stomach and a hypodermic of morphine, grain  $\frac{1}{8}$  to  $\frac{1}{4}$ , with 1/150 atropine. The

patient lies down for about 30 minutes and is then brought to the operating room. Before starting the operation I inject the posterior dental canal with 1 per cent procaine to which has been added 1 minim of epinephrine to 4 c.c. of the solution. I also inject the mucosa just anterior of the attachment of the middle turbinate to the nasal process of the maxillary bone. If there

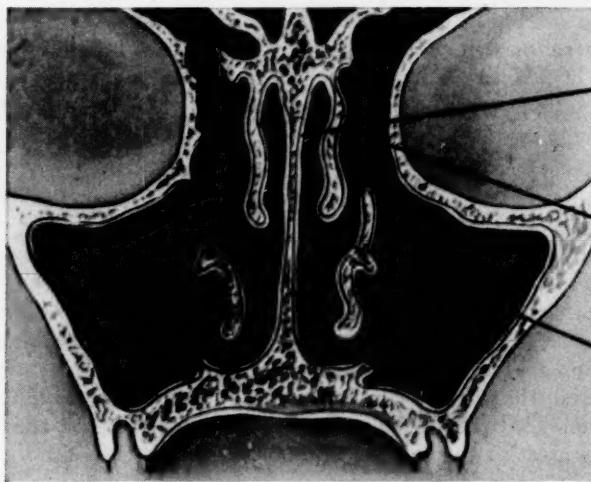


Fig. 1. Lateral view after operation.

is considerable infection of this region of the nose, I inject the anterior ethmoidal nerve through the orbit. I also inject the attachment of the anterior end of the inferior turbinate and along the inferior meatus before opening the antrum. The anesthesia is now complete for the operation.

#### TECHNIC OF INJECTION OF NASAL NERVE AND MECKELS GANGLION

**NASAL NERVE:** Instil a few drops of 0.25 per cent pontocaine into the conjunctival sac to prevent pain on inserting the needle. Lift the upper lid upward and inward by placing the thumb at the inner and upper margin of the orbit and direct the patient to look outward. Insert the needle through the plica semilunaris just below the upper lacrimal puncta, directing it slightly inward and upward, at an angle of about 30 degrees. The needle will soon strike the os planum, and on moving the point of the needle up and down, when inserted about 2 cm. ( $\frac{3}{4}$  inch) in depth it will engage in a groove the anterior end of which terminates in the anterior ethmoidal foramen. Here the nasal nerve leaves the orbit. Inject about 2 c.c. of 1 per cent solution of procaine. You may pass the needle a little deeper along the os planum and get the posterior ethmoidal nerve which is small. The injection of the nasal nerve is a very easy procedure. One can readily tell by careful manipulation when the needle is engaged in the groove near the anterior ethmoidal foramen.

**MECKEL'S GANGLION:** Paint the hard palate with 1:5000 acriflavine or your preferred antiseptic. Place the index finger on the hamular process of the internal pterygoid and bring it forward until a depression, the lower end of the posterior palatine canal, is palpated. Place the needle at an angle of about 45 degrees with the upper teeth and along the second molar about  $\frac{1}{8}$

inch from its root. This brings the needle near the canal, which is usually entered after three or four attempts. Pass the needle upward about 2.75 to 3.5 cm. (1 to 1 $\frac{1}{4}$  inches), when the point will be near Meckel's ganglion. The injection of Meckel's ganglion may be a little difficult at times, as one has to locate the canal, but usually this is not hard to do. If the needle be placed

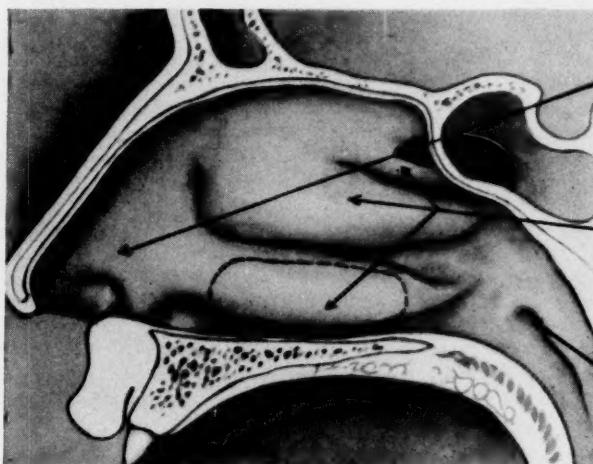


Fig. 2. Cross section after operation.

a little too far back, it may pierce the soft palate, in which case the fluid may run down the nasopharynx. If it be placed forward, it may puncture a vessel on the hard palate and cause a little bleeding. The second molar is an excellent guide for the site of injection, if one remembers that the canal is close to the margin of the hard palate. Inject about 2 c.c. of the procaine solution.

**PROCEDURE OF THE OPERATION:** A.—If the septum is crowding the operative side, I proceed to do a submucous resection first. This may be done preceding the sinus operation. Sometimes I do the two together. In proceeding with the sinus operation, I always open the antrum first. I push the inferior turbinate upward and inward, giving me an approach to inferior meatus. The antrum is opened with Reaves antrum rasp and then with the W. P. Reaves antrum punch, then the margin is carefully smoothed off with the antrum rasp. Cotton is now placed in the opening until the operation is finished.

B.—The middle turbinate is pushed toward the septum. If the middle turbinate is too large I proceed to trim it to the normal size for the space. If it is cystic I remove the outer wall of the cyst. The posterior ethmoid cells are now entered with a Sluder hook knife. After entering the posterior cells, the Anderson's sphenoid punch is used further to open up the cell. Begin by biting upward and forward. You can see the end of the instrument and you will soon have a large opening. When you reach the roof of the ethmoid, you continue with the instrument, biting forward. You will note that the instrument bites away from the roof of the ethmoid. No force is used in this region. The instrument must bite cleanly.

C.—If the sphenoid is to be opened, you may proceed to open into the sphenoid while working in the posterior ethmoid. Use the Sluder knife to

hook in the natural opening. Enlarge the opening sufficiently to insert the sphenoid punch. After entering the sphenoid you can work through the posterior ethmoid to complete the opening. In this manner you are sure of your location and know whether or not you have opened up your posterior ethmoids. Frequently you will find one large posterior ethmoid cell. This is fine when it is present.

D.—Having finished your posterior ethmoid and your sphenoid, you now move to the bulla region and clean up that area as far as you can toward the nasofrontal duct. You can also open up your agger nasi cells with this same punch. In moving into the field of the anterior ethmoid it will be necessary to use a small angular Gruenwald sinus punch. Bite away as many cells as possible right up into the floor of the frontal. Probe for the frontal opening, if found insert a Reaves probe pointed frontal rasp into the opening and enlarge it. Then take the large frontal rasp and continue to enlarge the opening. The floor of the frontal is frequently thin, especially extending out over the orbit. Use the rasp in this direction to break down the floor. Be careful not to rasp the side of the ethmoid or the hard bone anteriorly. The idea is to break down the floor then use the angle punch to bite away as much of this as possible. You will often find you will have a very nice opening. The secret of success in obtaining a good frontal opening which will remain patent is to remove the floor of the frontal, or rather roof of the anterior ethmoids, and not to rasp against the hard bone anteriorly.

E.—Probe now for your supra-antral cells. If you find any or if the tissue is diseased in the antral wall of the middle meatus proceed to enter with one of the rasps and then take the W. P. Reaves antrum punch and bite out this wall, or any other instrument that you can use in this region to bite out the wall and clean up the supra-antral cells.

F.—Finally, go over your entire operative field carefully and remove any spicules of bone that may protrude outward in this field as a clean field means quicker recovery.

G.—The entire operative field and the olfactory fissure is painted with 2 per cent mercurochrome. The antrum is packed with iodoform gauze saturated with 2 per cent mercurochrome. (Gauze saturated with sulfathiazole ointment will probably take the place of this.) This is left in place two days. The same is also laid gently up into the ethmoid field and left for two days. When the packing is removed there is very little bleeding. The blood clot is pulled from the ethmoid field and there is much less trouble with adhesions if this procedure is followed.

Remember the ethmoid field is not packed, the gauze is simply laid into this region. The postoperative care is carefully cleansing the nose about every other day for ten days or two weeks. A few cases will have to have eternal surgery, but the better the intranasal work the fewer these cases will be.

During the past six years I have performed the following intranasal operations: 155 antrums, 101 ethmoids, 42 frontals and 21 sphenoids. The operations were performed individually and in various combinations. I can recall but three antrums I have had to reopen and two of them were on one patient. I have had to reopen the posterior ethmoids a few times, cutting a web forming between the posterior and anterior ethmoid. I can recall having to reopen

a frontal no more than twice. I have had very little trouble keeping the sphenoid open. The secret of success is in using clean-cutting, biting instruments, removing the thin noncancelous bone. This produces a small amount of scar tissue and permits a more rapid regeneration of epithelium with cilia.

During this same period I have performed 13 radical operations on the antrums, and, so far as I know, they have been successful. Practically all of these were primary operations. The antrums were so diseased that, in my opinion, an intranasal window would not give satisfactory results. During this same period I have done 7 radical frontals, four of which were (bilateral) performed on two persons. This made five patients on whom radical frontals were performed. In one of the bilateral cases, it was necessary to make a small trephine, high in the center of the forehead, in order to clean out a superior cell or pocket. The result was perfect with only a very small scar showing. This patient is proud of the small scar because she got perfect results and has something to show that she had an operation. This patient had a high soprano voice. After recovering from the operation, she was unable to hit the high notes which she could easily reach before.

The other bilateral case was not so successful. It was a case of long standing where the frontal septum had become necrotic and was absorbed. Several years previously the patient had had an intranasal ethmoid and a radical antrum which was still infected on the left. I did an intranasal ethmoid (leaving the middle turbinate) and made an intranasal antrum window on the right with good results. I had large openings into both frontals after the radical operations. In carrying out the postoperative treatment I laid a piece of cotton saturated with a cocaine solution in the region of the left nasofrontal duct. I never found that cotton. The patient got along fine until about two months later when he caught a cold. After a few days he blew his nose and the cotton came out of the right side. I do not know whether it was the cotton lost in his sinus or the infection remaining in his left antrum, or both, was the cause of reinfection of his frontals giving a poor result.

A brief remark on how to keep a frontal sinus open after a radical operation. A soft rubber tube may be inserted into the opening at the time of the operation, or, as I prefer, pack the sinus and insert the tube after removing the packing in about 4 days. The tube may be taken out, cleaned and reinserted as often as you like by using a frontal dialator as an introducer. I grease the tube with a little scarlet red ointment. You may let the patient wear the tube for a month if you like.

I have a very strong conviction that there is a great need for improvement in intranasal sinus surgery. I am convinced that it can be performed safely and conservatively. Our job is to establish normal air passages for breathing, openings for drainage and ventilation. We must not destroy tissue necessary for the proper function of the nose. We must not operate until we have made a careful study of our patient and have decided that the operation will give relief. Radical operations will have to be performed but the number will grow smaller and smaller as the rhinologists improve in their intranasal surgery. We are on the road to bring nasal surgery out of disrepute, but we still have a steep grade to pull. Let us keep faith with our Maker and try to give back to the patient the nose originally designed for him, a nose free of obstructions, free of infection, with its normal physiologic functions. A nose functioning properly adds to the pleasure of life by giving flavor to one's food and resonance to one's voice. Plenty of fresh air filtered through the nose furnishes oxygen for the red cells and a feeling of well-being to one's person.

## SPINAL EPIDURAL VARICOSITIES

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**A**NATOMIC studies of the spinal epidural veins have been few although most standard texts describe them in some detail. Pathologic study of the spinal epidural space was almost unknown until the discovery of the protruded nucleus pulposus showed the importance of this neglected region of human anatomy. Since lesions in this area are more likely to produce severe pain and disability than death the opportunity for pathologic study has not been great. All neurosurgeons have seen cases in which a herniated nucleus pulposus was diagnosed but not found at operation. If the laminectomy was wide enough to give decompression some of these cases were relieved although nothing else was done. It is to be expected that some other epidural lesion was present.

Since most of the spinal epidural venous plexus is located anteriorly and since laminectomy exposes only the posterior aspect of the dura it is not often that the anterior space is explored. If the epidural veins are well developed so that severe bleeding occurs on such exploration the operator is usually content to confine his exploration to intradural palpation of the anterior dura wall. This is usually not sufficient to disclose epidural varicosities. It is the purpose of this paper to note the occurrence of epidural varicosities in the spinal canal, to report cases and to attempt to establish that not only do epidural veins exist but that an over abundance of these veins and varicosities can and do produce symptoms. A new method of electrocoagulation developed by me in 1939<sup>1</sup> makes possible a bold exploration of the anterior epidural space even when these vascular malformations are present.

Fay<sup>2</sup> and Batson<sup>3</sup> have recently called attention to the importance of the epidural veins. The former describing acute ascending paralysis caused by infection in these veins and the latter showing the role of epidural veins in spreading carcinoma from one part of the body to another without going through the lungs. I reported in 1940<sup>4</sup> several cases of varicosities of the epidural veins.

The most descriptive anatomic study of the epidural veins was found in Mettler's *Neuroanatomy*.<sup>5</sup> The vertebral veins are divided into internal and external plexuses. The external plexus lies outside of the bones. The internal plexuses are of greatest importance from the neurologic standpoint. There are two of these, one dorsal and one ventral which freely connect with each other. The anterior is much larger and into it drain the basi-vertebral veins from the

bodies of the vertebrae. In the cervical region the plexuses communicate with the vertebral veins and epidural veins at the base of the skull. Further down there is communication through the intervertebral veins with the intercostal, lumbar and lateral sacral veins. These veins have few valves and it has been proven that the flow of blood may be frequently reversed by conditions of increased intraabdominal or intrathoracic pressure.

The symptoms produced by epidural varicosities are similar to those of any other epidural lesion but certain features are outstanding and these should make the examiner suspect the lesion. All of our seven cases showed extreme aggravation of symptoms from coughing, sneezing and straining and achieved considerable relief by postural drainage. Aggravation of symptoms occurred when the part of the spine involved was lower than the heart. Thus, cervical varicosities necessitated sleeping with the head elevated. All cases had severe root pains. Paralysis and anesthesia were not marked although some muscular atrophy and hypesthesia occurred in four of the seven cases. Partial or complete block occurred in three cases while lipiodol showed the lesion in all of the four cases in which it was used.

The symptomatology can be summarized as follows:

1. Severe root pains—usually preventing sleep at night.
2. Pain relieved when the region of the spine affected is elevated above the heart level. A patient with cervical varicosities is relieved by sitting up. A patient with lumbar varicosities is relieved by lying down.
3. Coughing, sneezing, straining and jugular compression aggravate pain.
4. Objective neurologic signs such as paralysis, anesthesia and incontinence are seldom marked but are present in one half of the cases.
5. Queckenstedt test and lipiodol injection will usually show the lesion.

The pathology of these cases usually shows a thick fibrovascular mat in the epidural space, large enough to intrude upon and narrow the intradural canal. The epidural fat is usually absent. The largest varicosities are located anteriorly. Some of the individual varicities may be  $3/16$  inch in diameter and bleed profusely. There are frequently some arachnoidal adhesions which would lead one to make an incomplete diagnosis of arachnoiditis. Microscopic study of the removed veins shows them to be numerous, large and with thick walls and thickening of the intimal coat. There is considerable fibrosis between veins. Frequently no elastic fibers are seen. Some veins may be occluded and hyalinized. There is usually no epidural fat. Some cases show considerable polymorphonuclear infiltration suggesting the infectious origin of these.

Operation is indicated where the symptoms and signs are severe enough. We have seen cases where the epidural involvement was

too widespread to hope for relief by surgery. These are probably infectious in character and are related to if not identical with the cases described by Fay<sup>2</sup>. After exposure by laminectomy and making sure that the extradural varicosities are the main lesion (a spinal cord tumor may produce secondary varicosities) the varicosities are picked up with the electrocoagulation forceps and coagulated a small bit at a time. After a fairly large mass has been thus treated it can be picked up and easily cut away with small scissors. This leaves a relatively dry field. In going anteriorly one should be careful to ascertain that no compression of the cord results. One large venous sinus going into the basivertebral veins may have to be plugged with a bit of muscle. With this method of coagulation no body electrode is used and the coagulation occurs only in the tissue between the tips of the forceps. There is no tendency for the current to spread into the adjacent roots or cord and even the adjacent dura is not affected. Probably the greatest advantage accrues from the fact that a dry field is obtained throughout the procedure. A biopsy is taken by coagulating above and below a selected mass of veins and cutting through the coagulated regions.

Results of operation in the seven cases show practically complete relief of pain in six cases, partial relief in one. The shortest period of follow up was 11 months, the longest 35 months. There were no deaths in this group. In previous reports one case which represented a transition stage between acute epidural thrombophlebitis and varicose changes was reported. This patient died from extension of the process four months postoperatively, although considerable temporary improvement followed surgery.

#### SUMMARY OF CASES

Case No.	Loca-tion	Root Pains	Postural Effect	Paralysis Complete	Mild Atrophy	Hypes-thesias	Relief from Surgery
1.	Thoracic	Yes	Yes	No	No	Yes	Complete
2.	Cervical	Yes	Yes	No	Yes	Yes	Complete
3.	Lumbar	Yes	Yes	No	No	No	Partial
4.	Lumbar	Yes	Yes	No	No	Yes	Complete
5.	Lumbar	Yes	Yes	No	No	No	Almost Complete
6.	Thoracic	Yes	Yes	No	Yes	Yes	Complete
7.	Cervical	Yes	Yes	No	No	No	Complete

#### SUMMARY

1. The need for additional study of the spinal epidural space is noted.
2. Evidence is shown that varicosities and similar venous changes occur in the spinal epidural plexus and produce symptoms.
3. Seven cases are reported.
4. The pathology and surgical technic are described.

5. It is believed that this condition represents a clinical and pathologic entity.

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## THE EDUCATION OF A YOUNG PHYSICIAN FIFTY YEARS AGO

THE 1942 C. JEFF MILLER MEMORIAL LECTURE

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THOSE of us who have anything to do with medical education understandably doubt whether in this changing world any degree of stabilization will ever be achieved in this special field. Perhaps stability would not really be desirable. But it is doubtful whether in all educational history there ever existed such chaos as in October, 1891, when the young country boy who was my brother, and in whose honor this annual C. Jeff Miller Memorial Lecture has been instituted, entered the Medical Department of the University of Tennessee.

Let me prove my point by a single almost incredible illustration. In 1888, wrote F. H. Gerrish, a small child who had just learned to write was engaged to make inquiries of various medical schools as to the possibility of his admission to them. All the letters, necessarily, were illiterate, and in every one the child stated his ignorance of some branch or branches set down as essential for entrance in that particular school's announcement. One might reasonably have expected that such applications would have been promptly consigned to the wastebasket. They were not. About half of the schools queried declared their intention of abiding by their stated requirements. The others fairly tumbled over each other "in the indecent scramble to secure this prospective student, who frankly proclaimed his unfitness, even according to their miserable standards." Some, indeed, wrote that they never rejected anybody on examination, and held out the most enticing allurements to "this aggressively ignorant correspondent."

In 1894, the year after my brother was graduated from medical school, a somewhat more literate letter was sent to the group which had been so eager for students. This time the writer stated in all his letters that if Latin and natural philosophy were required for entrance, he could not undertake to learn them. Some of the schools now held to their catalog requirements. Some, evidently having been burned before, wrote non-committally, but invited the writer to matriculate, assuring him that any difficulties would be cleared away. The major number of schools, however, just as in 1888, came out "flat-footed and vociferously bid" for anybody who could

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be induced to attend them. Some even offered to furnish scholarships to cover part of the fees, though the applicant had not hinted at any financial difficulties.

The 1891 report of the Illinois State Board of Health, which seems to have become a sort of yardstick for the times, contained an analysis of the entrance requirements of 125 medical schools. Thirteen schools—one of them the University of Tennessee—had no entrance requirements at all. Sixty had requirements, sometimes to be demonstrated by examination, in English, arithmetic, United States history, geography, elementary physics, and natural philosophy. In many instances "the equivalent" could be substituted for the stated requirements, and "the equivalent" could have been defined then as Flexner defined it in 1910, that is, as "a device which concedes the necessity of a standard which it forthwith proceeds to evade." In many schools the requirements were too vague to be classified. One specified "a fair but not technical examination." A second required an examination "to see if the student were fit to study medicine." A third required "a fair knowledge of English and a belief in the Supreme Being," "a sublime faith" in Whom, Moses caustically commented, "would seem to be needed in view of the shocking deficiency of other qualifications."

It is interesting to note, when requirements were stated, the emphasis which was generally put upon English. Thus Harvard was one of perhaps a dozen colleges which required as part of the entrance examination the writing of an original composition of 200 words, to be graded on spelling, orthography, and grammar. Wrote Michaux in 1892, "Sir, we could forgive the applicants their Latin and Greek if they would but write respectable English and write it legibly," and the same author also demanded that state boards "*be empowered to reject applicants who cannot write their mother tongue with reasonable correctness.*"

There was considerable argument as to whether classical training should be insisted upon as a requirement for admission to medical school. Those who opposed it pointed out that a gelatin plate would not harden more promptly for the man who could read Horace in the original than for one "whose knowledge of the vinous old poet and his amorous odes has been obtained from a translation." It is instructive, in this connection, to remember that Hertzler, who took care of most of his preparation for Northwestern University himself, wrote in 1938 that if he had to prepare himself again for the study of medicine, he would again devote himself to Latin and Greek, though he had little enough of either, and to English composition and rhetoric, which he was taught by a Canadian who had the excellent concept that English was a good language to learn.

In 1891 the requirements for admission were relatively high at such schools as Harvard, Pennsylvania and Michigan, but generally they were far lower than those for B.A. and B.S. courses. In that year David Starr Jordan wrote that the number of college-bred men in medicine was lower than in any other profession, 1:12, as compared to 1:5 for lawyers and 1:4 for clergymen. The Army and Navy would have liked to insist on a preliminary academic degree, but realistically stated that on such a basis enough men could not have been secured to fill their vacancies. As it was, the percentage of failure was high, something over 66 per cent, for instance, in one examination involving 323 physically fit men. But at least they hitched their wagon to a star. The army medical man, wrote the President of the Army Medical School in 1897, must be a gentleman of equal culture with his associates at West Point. He must know history and literature. He must know that Plymouth Rock is not on the coast of Virginia. He cannot, if he claims to be an educated man, be ignorant of Shakespeare, Milton, Cervantes, Longfellow, Schiller, Prescott and Molière.

The mere possession of a baccalaureate degree, however, did not meet the situation. Such a degree might represent anything or nothing. In 1889 President Gilman of Hopkins wrote that it was important to restore, if possible, "the baccalaureate degree to an honorable significance before it is altogether lost." In 1891, Steiner, speaking almost with the tongue of President Hutchins of Chicago, stated that the degree was becoming a mere certificate that the person upon whom it had been conferred had spent some time at the institution of his choice and had taken such subjects as might have pleased him from the offered list of electives, in the event that he had not elected merely to pay the diploma fee and do no studying at all. In the same year McIntire wrote that the statement that the B.A. degree represented a definite training and had a well-recognized significance was a pleasing fiction not warranted by the facts. Well, in 1925 Flexner was complaining that the American college still valued the good fellow more than the good student, and that, as a result, the medical student body is practically always below the level which it seems to have attained, and at about the same time LeBaron Russell Briggs of Harvard was declaring that the B.S. degree did not imply a knowledge of science but merely guaranteed an ignorance of Latin.

It is somewhat curious, in view of these lamentations, to find the authors of the 1932 Report of the Commission on Medical Education putting their entire emphasis on preliminary training in the sciences and completely ignoring the emphasis on the ability to speak, read and write one's mother tongue which was so notable in the earlier and far lower entrance requirements. Small wonder

that in 1942 medical educators are complaining bitterly that neglect of the classics has not improved the English of this medical generation, and are declaring that the average medical student cannot tell you with any precision at all the content of a single paragraph he has just read, or even separate his own incoherent thoughts from those of the author he is trying to cite. For that matter, I should not like to submit the average medical student of my acquaintance to the test of a 200-word paragraph to be judged on orthography, spelling and grammar.

Meyer, in 1894, drew up a delightful set of qualifications for the would-be physician, including: 1. Good common sense. 2. A thorough and practical elementary education. 3. A classical education, since the language of the profession is Latin, and an ignoramus cannot comprehend an unknown tongue. 4. "First-class" morality, because the physician is admitted "to the inner life of the domestic hearth-stone . . . a privacy from which the world is, and should be excluded." 5. The married state. "Had I the power of dictation," wrote Dr. Meyer, "I would make this a universal law. It is almost impossible for a doctor to practise medicine without being called to see an elegant young lady, and how embarrassing to physician as well as the patient is such an interview. It should be disallowed." Herrick eliminated a few other aspirants. Cadaverous-looking persons, he remarked, should not be encouraged to enter the profession by those in charge of medical schools, since they do not inspire confidence.

Entrance examinations were an excellent method of evading entrance requirements, and were frequently given from that point of view by examiners appointed to evaluate students who had had no formal preliminary training. Other examiners examined the applicant merely by looking at him, sometimes in the course of a meal, sometimes after he had already been granted the M.D. degree. Some schools solved the problem neatly by giving up examinations altogether, with the naive explanation that nobody passed them anyway. At the other extreme, when the terms of the Garrett bequest to Johns Hopkins were accepted, few besides those trained at that university could meet them, and Osler is said to have remarked to Welch, "It is lucky that we get in as professors; we never could enter as students."

As to requirements in course, Pepper, studying 118 schools in 1892, found that only eight had four-year courses. Of the 108 who had two-year courses, 98 had the nominal requirement of an additional outside year. In the latter schools only two courses, each a repetition of the other, were usually required for graduation. The terms averaged five months each, and the student could enter late

and leave early both years, the dates, as Flexner later pointed out, being literally so arranged as not to conflict with seed-time and harvest. In 1894, after an examination of 50 catalogs, McIntire wrote that eight schools required attendance on certain classes and completion of certain laboratory courses before graduation, but that the remaining 42 made no such specifications, and the conclusion was warranted that it was possible for students to graduate from some of them, at least, without ever having seen a patient.

The minimum requirements in a two-year non-graded school, according to this same author, were "to purchase the necessary tickets, a note book, and, possibly, a pocket dictionary; to gather in the morning lecture room early enough to talk 'shop' with one's fellow-students for five or ten minutes; to rush, with a shout, at the close of one lecture into another lecture room, scurry down over the seats in a frantic endeavor to occupy a front place—to be seen by the professor; unless, indeed, it should be 'quiz' day, then it is prudent to demean one's self more modestly. The note book is filled with various suggestions from the lectures, chiefly with copies of prescriptions for future use in active practice. The attendance should be with regularity enough to enable the lecturer to become so acquainted with the features of the student that they will appear familiar when examination day arrives. Quite possibly a 'part' must be dissected. And this is all. The maximum amount of study includes 'quiz classes,' private courses, etc., offered as essential adjuncts to the college, but not required, and yielding as excellent results as those courses requiring more." One can understand why Berlin, in the early nineties, did not permit graduates of American medical schools to list themselves as M.D.'s in the catalogs of the universities of that city.

Examinations in course amounted to nothing at all in most schools, though Allis paints a sad picture of the medical student cramming for examination night after night into the small hours of the morning, his long tension of mind unrelieved by the slightest relaxation, overcome by the magnitude of work, with increasing perplexities every year, and the constantly menacing horror ever before him that after all he might fail of his diploma. The circumstances robbed him of his sleep and rendered him almost imbecile when his faculties should be at their brightest and best. The author closed his moving account with the extraordinary suggestion that if the law demanded four years of medical instruction and a diploma before the student were permitted to take the state board examination, then legislation should also be enacted to give him the justice he never had had, and to restore to him, if he should fail, the fees he had expended for lectures, as well as half his living expenses while in school.

Teaching was chiefly didactic and was always elementary. Anatomy, for many years the only contact between student and patient, was the best taught of the preclinical subjects, but details were over-emphasized, to the detriment of more important facts, as, for that matter, they still are. Of course, it was not always well taught. As late as 1910 it was being taught by dictation at one night medical school, and one Western school combined its dissecting laboratory with a chicken yard.

Pathology, bacteriology, pharmacology and physiologic chemistry were taught as organized laboratory courses for the first time in America when the Johns Hopkins School of Medicine was opened in 1893, and for a long time thereafter they were thus taught only there. Ohlmacher, in 1896, wrote that a few physicians in the United States might own microscopes, but most of them did not know how to use them, and the situation was not much improved over Welch's day, when he won a microscope for an essay on goiter but did not know what to do with it, and it never occurred to Francis Delafield, his instructor, to show him. The great Bigelow of Harvard had said in 1871 that the medical student should not permit himself to while away his time in the labyrinths of chemistry and physiology when he could more profitably be learning the difference between hernia and hydrocele. In 1882 Loomis was damning "the bacterian theory" as being rapidly disproved, and about the same time Mundé was writing that while germs were *supposed* to be in the atmosphere, their influence was to him still largely theoretical. In 1891 Parvin wrote, "The study of bacteriology has, I believe, undue importance in professional study and teaching," and added that nurses were being instructed in it, which to him was simply unthinkable. He was also arguing against vivisection on religious grounds, and, distinguished gynecologist though he was, was citing in opposition to it the opinion of Phillips Brooks, Tennyson, Browning and Whittier.

Clinical teaching, as we understand it, did not exist. In 1889 not one medical practice act in the United States distinctly prescribed it, and not more than a dozen schools did any bedside teaching. Such contacts as the students did have with patients were made by way of general practitioners, who had no training or special aptitude for the teaching profession. In the pre-Hopkins days clinical clerkship was not a part of the routine of any hospital. Students were barred from the wards of some New York institutions as "hurtful to the best interests of the patient," and one hospital recommended that they be admitted directly to the operating room from the street, to avoid disturbance of "the quietude so necessary about hospital wards and corridors." This was still the age—as in some

schools it is still the age—when the professor knew and the student learned. Cushing mentions the shock which the first students at Hopkins must have had when they discovered that they were expected to acquire most of their knowledge for themselves.

Pneumonia and typhoid fever were for many years the chief diseases studied clinically, although, as Hertzler emphasized many years later, a man who heard enough and read enough about a disease, and looked at enough pictures of it, would not make a bad job of recognizing it when he actually encountered it, particularly if he were trained, as Hertzler was, by instructors who comprehended the importance of facts and who also comprehended that they were not inherited congenitally but must be acquired.

As to therapy, a note in the *Journal of the American Medical Association* in 1889 is suggestive. It described the formation of a castor oil trust, the business being so profitable that new capital was finding its way in and it was necessary to regulate competition and control output.

I need not remind you of the status of surgery in the early nineties. Surgical procedures were still chiefly emergency and superficial. Appendicitis in the modern concept had been described only in 1886, and the idea of immediate surgery for the acute disease was anything but universal. Antisepsis had finally been accepted, but the frock-coated surgeon, his coat stiff with blood, his needles stuck in his lapel, his sutures dangling around his neck, was still a familiar sight in the operating room. Aseptic surgery was as yet a very long way off. Rubber gloves had not yet been introduced. Erichsen, in 1855, had said, "The practice of surgery is at its climax and no further advances are possible," but Cheever, with more percipience, had written in 1889, "I believe that we are warranted in saying that the future of surgery is without limit." And so it has proved.

You may be interested in something concerning the status of gynecology, which was my late brother's field. Gynecology was described in the *Transactions of the American Gynecological Society* as evidence of "the keen interest felt by the entire medical profession in all that relates to the dearest members of society." The merits of various types of intrauterine treatment were being passionately debated in the early nineties, as was the proper treatment of uterine displacements; one man always carried a pessary or two in his pocket. Arguments were continuing as to whether electricity or surgery were the better treatment for ectopic pregnancy. Electrolysis, however, was no longer very popular for fibroids, and it was granted that hysterectomy was indicated in some cases at least, particularly those in which chronic invalidism and risk to life were

definite. Some gynecologists, indeed, liked the operation so much that they seemed to be devising conditions for which to use it, though what to do with the pedicle of the fibroid was still a matter for vigorous discussion. Johnstone had shortly before (1887) declared, "If we wish to have a clear idea of the true physiological position of the uterus, we must emancipate it from the thraldom of the ovary, in whose firm grasp for the last fifty years it has been securely held." Dickenson, with several pages of illustrations—you really would not believe them unless you saw them—was prescribing the proper costumes for women. Noeggerath's clear-sighted views on gonorrhea and on the husband's responsibility for it still went without acceptance, as might have been expected. Had not Barker said, "If these views are true, a modification of this paper should be found in every Sabbath-school library throughout the land?" Had not Johnson remarked that if they were true, "the mere instinct of man ought to restrain him from so brutal an act as becoming married to a young woman when aware of the consequences?"

Perhaps most remarkable of all, Battey had just reported the end-results of his barbarous operation (removal of the normal ovaries) in 54 women between the ages of 18 and 45 years. The results of this operation were less good in America than in England, probably, Reamy suggested, because of climatic influences, but some of Battey's achievements must have been difficult to surpass anywhere. One bedridden patient, who formerly took huge doses of opiates, after operation "bounced like an India-rubber ball at once into a state of perfected health and comfort." A second had become "bright and cheerful and . . . ever trying to cultivate the grace of thankfulness." And a third had so far recovered as to be able to attend all the picnics in the neighborhood.

In the half century prior to 1910, according to Flexner, the United States and Canada together produced 457 medical schools. Today there are only 76 in both countries, and there are some who think, in spite of the needs of war, that we are over-supplied. But in the early nineties medical education was a commercial affair, and before laboratory sciences with their need for equipment were generally taught, it was a very profitable business. Positions on the faculty were sometimes so lucrative that fees were paid to hold them. Many faculties consisted chiefly of professors, the situation probably being about as it was in 1910, when Flexner calculated that there were 4,000 professorial titles in 150 medical schools. In the unlikely event that two schools did merge, the new school, as Flexner pointed out, was the arithmetical sum of the old faculties, professors and all. The tendency, however, was not for mergers

but for multiplication. If the faculty quarreled among themselves, some of them merely withdrew and founded a new school. Since there were few or no legal requirements for the practice of medicine, a charter was a simple matter to secure. It was of small moment that the proposed schools had no equipment or buildings, no endowments to supply them, no assets except prospective fees, no criteria for the selection of a faculty except that its members happened to be in the neighborhood. The connection between a university and its medical school frequently consisted only in the permission to the school to issue diplomas in the name of the university, which had itself no responsibility for the school's standards or support. As late as 1910 Southwestern University of Texas was legally protected from all responsibility for the debts of its medical department at Dallas. Schools frankly advertised for pupils, and one enterprising institution offered a trip to Europe as a sort of bonus to all students who had attended more than three years.

In 1892 the entire productive endowment of United States medical schools was \$611,000, against more than \$17,500,000 for schools of theology, although there were twice as many medical as theological students. In 1891 there were only five endowed chairs in American medical colleges, none of them west or south of Philadelphia, against 171 in theology. In the same year there were only 59 public medical libraries in the United States, and only six of them, including the Surgeon General's Library, contained more than 10,000 volumes each.

The relationship of schools and hospitals was uncertain and confused. The development of the Johns Hopkins School of Medicine with its own hospital represented a new departure in American medicine, though the necessity for clinical material had long before been recognized. It had reached a genuine mania in some schools, which advertised for it, while other schools suggested close co-operation with the police, so that a patient unwilling to enter the hospital might be forcibly inducted into it. Schools in the same community vied with each other in giving appointments to physicians and surgeons who already held hospital posts, thus completely reversing the proper educational methods. A rather curious concept of hospitals prevailed in some quarters, some writers being uncertain as to the wisdom of treating in them such conditions as gonorrhœa and acute alcoholism and its complications, lest they become mere annexes of the bar room.

The result of this educational chaos was that almost anybody who wanted to study medicine could do so, and the M.D. degree, which carried the license to practise without further formalities almost anywhere in the country, was given to almost any student

who merely stayed around the required length of time. In the United States, it was said, anybody with \$200 and a few months to spare could leave his plough in the field and become a physician, though it was frankly admitted that in most instances the aspirant would have done better to remain back home on the farm. As a result of such easy standards, the profession was hopelessly overcrowded, and it was difficult to make a living. In New York in 1891 a medical student killed himself, leaving a note which read, "I die because there is room for no more doctors."

There was another reason why physicians had difficulty making a living out of their profession, that free dispensaries were crowding them out. The treatment in charity clinics of patients well able to pay for their care is a continuing evil, but probably the situation is nowhere so blatantly bad today as it was in New York in the early nineties, when a certain medical editor, visiting a dispensary crowded with fashionably dressed, evidently well-to-do patients waiting for free treatment and medicine, wrote that it would not have surprised him to hear the announcement of the presentation of a beautiful prize etching to the patients who had made the most visits to the clinic during the month. In the search for patients physicians sometimes made house to house visits looking for them, or took contract practice at 10 cents a visit.

Quackery was naturally rampant. So-called physicians erected blazing signs before their offices, or brass hands pointing to them. They carried dogs trained to bark at passersby. They employed "cappers" or "steerers" at railroad stations. The circumstances were far better in England than in the United States, yet even there Jonathan Hutchinson wrote in 1895, "Let us put no artificial impediments in the way of entrance to our ranks. Let us, however, at the same time, by careful attention to the details of our examinations, make sure of this—that if we are to be overcrowded, it shall be by well-mannered gentlemen."

Of course, there had been many attempts to improve the situation, particularly by such individual schools as Pennsylvania, Harvard and Michigan, which persisted in their efforts in spite of the bitterly competitive world in which they found themselves. As early as 1846 the American Medical Association was founded on two propositions, that "young men received as students of medicine should have acquired a suitable preliminary education," and that "a uniform elevated standard of requirements for the degree of M.D. should be adopted by all the medical schools in the United States." Other organizations were founded later with the same general aims. The American Academy of Medicine, established in 1876, had as its objects to raise the standards of preliminary train-

ing and practice and to enact uniform state laws, "disregarding diplomas issued by medical colleges." By 1891 it had almost 600 members and also had \$7.58 in its treasury. In that year the Association of American Medical Colleges was founded, and the Southern Medical College Association came into existence in 1892. The Council on Medical Education and Hospitals of the American Medical Association, however, did not make its first inspection of medical schools until 1906, and it was not until 1910 that Flexner's report on medical education in the United States was issued and the whole face of American medicine forthwith began to be changed.

Physicians interested in the profession had for years been steadily demanding state control of the license to practise medicine, as in European countries. By 1894, 42 states and territories had some sort of law, although only 11 required examinations, in which the percentage of failures was very high. The others merely required registration of the diploma, and did not insist upon that.

Even these feeble results had not been achieved without opposition by the profession and the public. In 1891 Billings stated what is still a universal truth when he wrote that the great mass of the public knew little and cared less about the education and professional standards of the physicians to whom they entrusted their bodies and their lives. Paine, the following year, said that he had heard it intimated that entrance examinations were an interference with the inalienable right of young men to pursue the study of medicine, and Moses was declaring that the American medical student was an individualist, with strong ideas about his personal freedom. While Osler was stating that the right to regulate the practice of medicine was within the general police power of the state, which extends protection to life and limb, William James, himself a physician as well as a philosopher, was appearing before the Massachusetts Legislature to protest against a law requiring a medical diploma or state licensure for the practice of medicine.

Whatever was wrong about medical education in the United States in general was doubly wrong in the South in particular. Then as now this portion of the country was the nation's number one economic problem. In 1865 the South had emerged, on the losing side, from a long and grueling war. It was saddled with a large negro population, no longer slaves, for whom, as in many respects it still does, it had the responsibility but of whom it did not have the control. Educational facilities were extremely poor. As late as 1910 Flexner, instead of insisting on preliminary college credits, as elsewhere in the country, was willing to compromise in the South on a high school education until college training could reasonably be insisted on.

Prior to 1893 no academic qualifications were required for matriculation in any Southern medical college. The courses were even shorter than they were elsewhere. Examinations were deliberately made easy. Otherwise 90 per cent of the students would have failed. In the five-year period ending in 1892, wrote Elkin of Atlanta, the medical schools of Maryland, Kentucky, Tennessee and Georgia graduated 5,829 students—a larger number, incidentally, than was graduated by all the medical schools of the country in 1941—and he added that he personally believed that the number of persons killed by incompetent practitioners in the preceding 25 years exceeded the number killed in battle in the War Between the States.

In 1910 Flexner was damning the medical schools of the South in much the same language. Tennessee had had 18 medical schools in all, of which nine still survived, these comprising a total number of more low-grade schools than any other Southern state. Students who could not get into one institution merely went to another, often with forged credentials. "Such breaches as were caused by failures were repaired by immigration," which produced, in the now defunct Atlanta College of Medicine in 1908-1909, the astonishing spectacle of 31 senior students, all admitted by advanced standing, against a single first-year student. The Georgia College of Eclectic Medicine and Surgery won the comment that "Nothing more disgraceful calling itself a medical school can be found anywhere."

Such, then, was the confused situation in American medicine when 50 years ago last October my brother, the late Dr. C. Jeff Miller, entered the Medical Department of the University of Tennessee. He was only 18 years old. He had been educated in the local schools of Cowan, Tennessee, where he was born, and at Terrel College, seven miles from there. The head of that so-called college came of a family of born teachers, and I recall, from my own later days there, not only the beautiful red brick building which housed the school but also the strict, stern discipline, more appreciated now than then, which extended to social as well as academic matters. The young medical student, by modern standards, was very poorly prepared. On the other hand, in one respect he was far better prepared than most present-day medical students. Even then he was an omnivorous reader, and I clearly remember, many years later, my father's complaints that when he sent my brother out to plough a field he was very likely, when he went to find out how much he had accomplished, to discover him reading under a tree, while the horses rested and the field remained unploughed.

In 1891, however, the Medical Department of the University of Tennessee was not concerned with such trifling matters as en-

trance credits. In its announcement for the year it had proclaimed its official approval of both higher entrance requirements and a three-year course. Then it hurriedly added that such requirements would not be exacted of any student who took his first course of lectures during the coming winter.

So there was no difficulty about the admission of young Jeff Miller to the medical school. There also seems to have been no difficulty about his graduation, or about that of any of his fellow-students, judging from the fact that 114 of them entered in 1891 and 114 of them graduated in 1893. A three-year course was offered, but only two years were required, and no student in this class seems to have taken the longer course. The term lasted from October 1 to late in February, and only one of the two years need be taken at Tennessee.

The first year included anatomy, physiology, chemistry, *materia medica*, surgical clinics, and dissection, and the second year the same studies plus surgery, theory and practice of medicine, obstetrics, gynecology, and diseases of children. Certain other courses, such as diseases of the eye, ear and throat, medical jurisprudence, state medicine and dermatology, were taught, though it is not clear just when or where.

The full course of lectures cost \$75, and it was stated in the announcement that no sub-faculty charging additional fees would be permitted in or around the college. Certain courses, however, were extra. Bacteriology, for instance, was elective and cost five dollars additional. Dr. Joseph H. Hickson, who was in my brother's class at Tennessee and who is now sanitarian at Yale, writes me that although he has specialized in public health most of his professional life, he did not himself take this particular course in his undergraduate days. Microscopy, chemistry and minor surgery were also elective. Said the catalog, "In the way of Medical progress, we have arranged for the convenience of our students a Microscopic Laboratory. A supply of good microscopes, with facilities for the study of the branch of increasing importance, under the supervision of a competent Demonstrator, will furnish another feature in this department," enabling the student "at once to take position in the front rank of the profession." Full provision was made for the study of anatomy, "the most important department of medical teaching," in 16 separate dissecting rooms, and there was an "elegant and commodious Museum Hall," with a "well-selected assortment of the finest and most approved Anatomical and other models received from the Paris manufactories," one of which, a "Dissecting Model Man," cost \$750.

"All of the railroad and most of the local surgery of Nashville and surrounding country," stated the catalog, "is exclusively in the hands of members of this Faculty, giving the students facilities which are rarely enjoyed in any College." The City Hospital, the Catholic Hospital, and the Free College Dispensary, in all of which clinical teaching was permitted, offered "clinical hospital advantages not surpassed by any school in the country." In addition to the "regular Didactic and Clinical Lectures," operative gynecology was taught by "speculum, probe, digital touch, etc., together with the approved and recognized plans of uterine and intra-uterine treatment." As many advanced students as possible had one or more cases of midwifery "allotted to their exclusive care, with the privilege of summoning the Professor of Obstetrics to their assistance should difficulties arise." There was also taught a "thorough practical knowledge of the extraction of teeth, etc.," since the Dental Department was conducted in connection with the Medical Department.

Dr. H. P. Williams, who seems not to have been connected with the school, was my brother's preceptor, but by that time the relation between preceptor and student was probably purely nominal. The medical faculty had 25 members, 18 of whom, somewhat overwhelmingly, held the title of professor. Two had graduated from the University of Pennsylvania, one from Vanderbilt, eight from the University of Tennessee, and the others from schools which, as such, are no longer in existence. I have a rather tender feeling toward that Faculty, for I bear, as does my son after me, the names of two of them, Dr. Thomas Hilliard Wood, who was Professor of Physiology and Physiological Anatomy, and Dr. Duncan Eve, Dean of the school. Another member was Dr. William D. Haggard, whose son, W. D. Haggard, Jr., was in my brother's class. In later years these two followed or succeeded each other in the presidency of the Southern Surgical Association, the American College of Surgeons and the Southeastern Surgical Congress. Will Haggard was President of the American Medical Association and my brother of the American Gynecological Society, which would be an unusual combination of honors for a single class in a modern medical school.

Dr. W. J. Breeding of Nashville, who graduated from the University of Tennessee Medical Department in 1893, has kindly written me some personal recollections of his school days. Some of them are very revealing. "Jeff Miller," he writes, "was a hard student, always present at lectures, a careful note-taker, always sober [which is an unconscious commentary on the students of the time], well dressed, and had a nice suit of curly hair, which he kept well combed—in fact, he was a good-looking youngster." Dr.

Breeding describes the daily quiz period. Dr. Haggard, who taught gynecology, spent most of his time on cystitis. Dr. John S. Cain, who taught the practice of medicine, had no quiz list and merely pointed to his victims. The students he knew by name, such as young Jeff Miller, he frequently called on, saying, "What do you say, Miller? You always know everything." Dr. Duncan Eve, although he worked with a quiz list, also knew most of the students by name. Often he did not get a correct reply until he had reached the names of Haggard or Miller, and he would say, "Tut! Tut! Gentlemen!" Dr. Breeding mentions the Paul F. Eve Medical Society, sponsored by the graduating class, which met regularly for the reading and discussion of medical subjects. My brother, he recalls, "was a very active member, and his discussion (even at this embryonic period in his medical career) attracted special attention." "I was always impressed," he concludes, "with his studious habits and gentlemanly bearing."

And so after 10 months of medical training, most of which consisted of didactic lectures, Jeff Miller was graduated from the University of Tennessee and went on to an internship at the Nashville City Hospital. Usually only one such internship was awarded each year, by competitive examination, but in 1893, so excellent were the examinations of Jeff Miller and Will Haggard, that no choice was possible and both were appointed. Following his internship, my brother taught for a brief period at Sewanee, and I myself studied anatomy from the same Gray, with the mark of his saddle on it, which he studied as he rode to and from his classes there. Then he practised for a few months with Dr. Thaddeus Johnston, our uncle, who was chief physician for the Tennessee Coal, Iron and Railroad Company, at that time located at South Pittsburg, Tennessee. The spanking team of horses and the fine carriage which my uncle drove as he visited his patients, quite aside from the medical conversations en route, had no little to do with my going into medicine, and I have no doubt that they had already exerted a similar influence on my brother.

In 1894 young Dr. Miller paid a visit to New Orleans with his wife to meet her relatives. He spent the remainder of his life there. He encountered a yellow fever epidemic, worked in it, had the disease himself, and then settled down to practise. He became associated with the late Dr. Ernest S. Lewis at the New Orleans Charity Hospital, was his chief of clinic, and eventually was head, first of the Department of Obstetrics, and later of the Department of Gynecology of Tulane University, being one of the first outsiders to violate the tradition that only a Tulane graduate could hold such a post.

It would be foolish, and falsely modest as well, if I were to pretend that my brother, who before he died was given some of the highest honors in American medicine, did not become a distinguished physician. How did it happen? The training he had was limited and inadequate even for those days. Remember that the Johns Hopkins School of Medicine, which established a new era in medical education, did not open its doors until the year he graduated, and he and his fellow-student, Will Haggard, were not trained in that tradition.

But why these two men and some of their contemporaries became great physicians is not very difficult to determine. Flexner in 1910 pointed out that the best products of the old system were hard to reconcile with the system itself, and so they were, but, as one dean wrote in 1932, "I sigh for the good old days when we obtained our students from the first class high schools. Those boys were full of enthusiasm, eager to receive, and not yet sophisticated to the point of selecting a specialty in the undergraduate years of medicine." In other words, curiosity had not yet been bred out of them, and students who were serious in their work knew very well that only by hard work could rewards be won. My earliest recollection of my brother, who was many years older than I, is of a man who read incessantly and who had an insatiable curiosity and a limitless ambition. He was entirely free all through his life "from vacillation and vagrancy of mind."

Medical students were formerly taught a good deal which was erroneous and had better be forgotten. There was much waste of time and effort. By modern criteria they were turned out ill-fitted for the practice of medicine. At the best it could scarcely have been otherwise. Medicine and surgery have been revolutionized in the last 75 years, for one thing, and for another, the most adequate medical educational facilities of those early days were still inadequate. Nevertheless, the serious students were turned out then with something which all too many of even the best students lack today, a realization that they were trained for a profession as contrasted with a business, a profession which had its own peculiar dignity, its own sense of the value of human life, its own special concepts of conduct and behavior and action. In other words, those students recognized what were the "durable satisfactions of life," and they knew that they must create, each for himself, their standards of ultimate values.

Many of the good results were due to the teachers. They gave the students relatively little knowledge, Hertzler wrote, but they did teach them the will to do and to strive unceasingly, and each one had the merit of being the product of his own experience. In-

deed, as Cheever recently wrote of Flexner's 1910 report on medical education, "He might have described, without weakening his argument, the many high-minded men who, attracted to medicine in the first instance by its opportunities for altruistic service and for scientific investigation, performed laborious and self-sacrificing work as teachers without the expectation of more than nominal monetary compensation to the end that worthy successors might be trained to carry on the profession which they loved. Those heroes of a previous epoch, so slightly referred to by some modern educators, did the best they could with what the times had to offer for their help."

Today there is not a medical school in the United States which requires less than two years of largely specified college training for admission, and most of them require more. There is not a school whose course is less than four years of graded and largely specified work. All of them meet certain minimum requirements as to faculty, equipment, facilities and libraries, and most of them exceed them. Eleven schools and 21 state boards require an intern year for graduation or licensure, and the majority of graduates, regardless of legal requirements, serve internships and residencies. In every respect standards have been raised and training has been improved. It seems contradictory, therefore, to say that somewhere along the way something has been lost. Yet it has been.

Precious little our fathers knew,  
Precious little when all is said.  
Most of their teachings were quite untrue,  
Most of their remedies cured your dead.  
But down from the heavens or up from the mold  
Send us the hearts of our fathers of old.

There it is. The emphasis on what the individual makes of his own opportunities has been largely forgotten today, yet it is still the most vital thing of all. General MacArthur and his outnumbered men are engaged in proving it to us again on Bataan Peninsula. It is the thing which explains above all others why the young country boy who was my brother, with his brief and inadequate medical training, was when he died one of the distinguished physicians of the country.

Almost 75 years ago, four years before my brother was born, Sir James Paget pointed out the same thing. Abernethy, as he entered the anatomical theatre for one of his introductory lectures, is said to have flung at his students the question, "God help you, gentlemen! What is going to become of you?" In an endeavor to answer that question Sir James Paget traced a thousand medical students 15 years after they had left St. Bartholomew's. He found

that 23 had achieved distinguished success, 66 considerable success, 507 fair success, and 124 very limited success. The remainder had left the profession, had died in school or after beginning practice, or had failed altogether. I imagine the proportions would be much the same in any class from that time onward, and I know that this same explanation is still the explanation of the success or failure that comes to every man:

"In remembering those with whom I was year after year associated," wrote Paget, "and whom it was my habit to study, nothing appears more certain than that the personal character, the very nature, the will of each student had far greater force in determining his career than any helps or hindrances whatever. All my recollections would lead me to tell that every student may draw from his daily life a very likely forecast of his life in practice, for it will depend on himself a hundredfold more than on circumstances. Time and the place, the work to be done, and its responsibilities, will change; but the man will be the same, except in so far as he may change himself."

Many years later Rudyard Kipling set it down another way: "Hard toil, high courage, eternal sacrifice, bitter disappointment—by these things are visions translated and dreams brought to pass." Very early in his life my brother learned that lesson. He never forgot it. That was why, when he died, all the tributes paid to him could have been summed up in two sentences. One of those sentences is "Faithful hath been thy warfare." The second is "He never cast off his harness until his feet had entered the river." Those of you who knew him and who admired and loved him would want, I think, to add to those two sentences one that is even more conclusive: "And so Valiant-for-Truth passed over, and all the trumpets sounded for him on the other side."

*Note.*—My thanks are due to Dr. O. W. Hyman, Dean of the College of Medicine of the University of Tennessee, who, with the assistance of Miss Valerie Roach, provided the data upon which the statements about the University of Tennessee Medical Department are based.

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## PRINCIPLES IN SURGERY OF THE COLON

**P**POSSESSION of a healthy body and mind and the power to maintain them is a gift which, although not necessarily indispensable to the achievement of a serviceable life, nevertheless makes more culpable one who contributes little during the lifetime allotted than the person not so endowed.

At this time I am concerned but indirectly with the mind, and would direct your attention to that part of the anatomy which we are to discuss. There are a few matters, however, relative to the body to which it may be well again to draw your attention. We take for granted most things that exist and unfortunately have little time to sit and ponder on the wonderfulness of their formation and the functions inherent in the purposes of their existence. For instance, we accept without much thought the fact that we have two eyes, two ears, two hands and two feet, and it is not until the function of one or both of them is impaired or lost that they are, in fact, appreciated. Further, we may consider a somewhat analogous thought: when a useful but not essential part of the body is impaired or lost, certain compensatory mechanisms are brought into play, if life is not lost, and these in varying degrees take over the function of the impaired part or compensate for it. These mechanisms may, in fact, so change life for an individual from a psychologic standpoint, in that they bring about an acute appreciation of it, that, comparatively, life becomes fuller and accomplishment greater thereby.

To come back, or should I say "down," to the colon and the approach of the student interested in it: the colon is that part of

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Leroy Long Memorial Lecture, University of Oklahoma, Oklahoma City, March 13, 1942.

\*In active military service.

the large bowel which extends from the junction of the small intestine at the ileocecal valve to the rectosigmoid. The rectum, not usually considered a part of it, extends from the rectosigmoid to the anus and is from 4 to 6 inches (about 10 to 15 cm.) long. The colon is between 5 and 6 feet (152 and 183 cm.) long, and varies in diameter from 7.5 cm. in the right portion to 3 cm. in the left portion, in adult life.

In the practice of medicine, one sees faults to which the colon and rectum are liable because of malformation in embryonic life, just as one sees faults to which other parts of the body are subject. Some are serious and some are not. At present, I have as a patient in the hospital a baby who was born without an anus and with but a remnant of rectum, on whom it has been necessary to perform colostomy to preserve life. As to be expected, the content of the colon in the newborn, which is known as meconium, proved to be sterile. This is mentioned because it is of surgical importance, in that soiling by meconium does not cause infection, which is a hazard to be guarded against only a few hours later, when ingestion of the first food has taken place.

Malrotation, more often than not, is not of serious consequence. A normal existence may be lived without knowledge of the condition, or obstruction may develop consequent upon it, to make surgical intervention necessary to correct the mechanical blockage.

Despite the importance of the colon, since it does have important functions to perform, the life of a person can go on without it; as a matter of fact, in certain disease processes life with it may be unbearable, unproductive, or impossible.

What are the functions of the colon under normal conditions? In the main, there are two: first, to reabsorb water and certain salts to help to maintain a salt-water balance in the body, and second, to act as a temporary storage plant for waste or unused material which is ingested.

In a sense, the whole colon performs both functions, but if the colon is divided into two parts: namely, the right portion (including the cecum, ascending portion, hepatic flexure and the first half of the transverse colon) and the left portion (including the distal half of the transverse colon, the splenic flexure, and descending and sigmoid portions of the colon), the right half has more of the function of absorption and the left half has more of that of storage. The reason for this, obviously, is that the contents of the small bowel are delivered into the colon at the ileocecal valve with much liquid; as the necessary elements are removed by the blood and by lymphatic channels and the material within the bowel moves by peri-

staltic waves to the left portion of the colon, it normally becomes more solid in form.

The duties of the colon may be altered or, with the exception of the duty of very temporary storage, may be upset by acute, subacute or chronic pathologic processes. The degree of dysfunction will depend on the type and extent of the colonic disease present. This is a very important consideration, medically and surgically, because it affects so vitally what is to be done for the patient afflicted.

As previously mentioned, when a non-vital part is lost, compensatory mechanisms come into play; thus, when the absorptive properties of the right portion of the colon are lost, some other part of the body must take over those properties or death will ensue. In this instance, the added burden happens to fall on the kidneys. If a normal left portion of colon can be preserved and if an anastomosis can be made so that intestinal contents can be shifted to it, the burden is divided because the left portion of the colon has taken on more responsibility, so to speak.

What about the element of time or duration of disease, as related to surgical possibilities and risks? Naturally, there are many conditions which influence this, such as the nature and extent of the pathologic process, but in this respect let us assume that the function of the part is materially affected.

There is a difference in the rate of adjustability, dependent on the individual person, which is influenced by age, virulence of organisms, and secondary disease, related or unrelated to the primary one, of greatest momentary import; in short, it is dependent on the degree of health of all the other parts of the body combined, and it is most important to determine this fact prior to operation in order to be able to evaluate the risks involved.

Acute disease, although it may be an exacerbation of a chronic condition, in general implies a rapid onset. If it has a massive and extensive effect on the function of a part, the sudden shift of duties to other organs may be too great for their immediate capabilities and death may result. On the other hand, acute disease may be amenable to therapy and clear up rapidly or subside into a subacute and then chronic state; thus, more gradual shifting of function allows time for training the other organs to adjust themselves to take over the load.

Let us illustrate this as it applies to the colon by two types of cases: in the first, by chronic ulcerative colitis which has gradually affected the right half of the colon and, in the second, by congenital multiple polyposis which may affect an equivalent portion of the

bowel. In the first instance, the function has been destroyed gradually; in the second, a hereditary and potentially dangerous condition exists, but without interference of function. Ileostomy may be the first of a multiple-stage procedure and, true, it is hazardous in the presence of both conditions but more hazardous in the case in which function has not been interfered with by the pathologic condition. The postoperative problem is concerned with maintenance of a salt-water balance in the body when the kidneys have not yet been called upon to play their added part in this regard. Ileostomy in cases of ulcerative colitis, except in instances of general debility, does not entail such careful postoperative care as to salt-water balance because a chronic disease has gradually allowed other organs to take over the function of the faulty organ to a degree that allows life to be maintained.

When alteration in normal bowel habits occurs, and consequent signs and symptoms develop, the diagnosis, aside from the laboratory and roentgenographic evidence, is made on the basis of an understanding of the function of the various organs. Thus, in ulcerative colitis, when there exists but a narrow, shortened, ulcerated tube, it is but natural that with reduced absorption and reduced storage space there should follow frequent evacuations of watery, burning stools.

The difference in the frequency with which obstruction occurs in the right and the left parts of the colon is explainable not on the size of the lesion but by a combination of the anatomic size of the lumen, the structure of the wall of the bowel, the mobility of the region and, last but not least, again the fluid nature of the contents of the right portion and the more solid form of the contents of the left portion of bowel.

When obstruction does occur in the right half of the colon, it usually is subacute in nature. You appreciate, from experience perhaps, and from the literature for sure, the part played by obstruction in appendicitis. I refer to appendicitis because in 17 per cent of malignant lesions of the right portion of the colon, sufficient obstruction exists to have caused chronic, subacute or acute appendicitis, and the patient has been operated on for the secondary result of a primary cause. Malignant lesions of the colon are not so uncommon among patients less than 40 years old as many believe. Almost a fourth of the patients who have lesions of the right part of the colon of this nature are of this age group. However, only a little more than 2 per cent are less than 30 years old. The lesson to be learned is this: in any patient 30 years old or more, for whom appendectomy seems to be indicated, an incision should

be made through which adequate surgical exploration of that part of the colon can be made.

Symptoms and signs of acute obstruction which have not been preceded by a subacute or chronic form of blockage are rather uncommon in the colon. Complete blockage occurs most frequently in the splenic flexure. When colonic obstruction is sufficient in degree to be treated by medical decompression by the Miller-Abbott or the Wangensteen tube, how long is the surgeon justified in using such measures? Experience has shown that the time is not long. Decompression of this type should be used as a measure to prepare the patient for surgical treatment. The relief obtained by such measures may lull the surgeon into a sense of false security. A competent ileocecal valve may not allow reflux of gas or fluid from the colon back into the small bowel, and there are instances in which delay in institution of surgical treatment has resulted in rupture at some point in the right half of the colon.

Certainly, in a consideration of the principles of surgery of the colon some comment as to the anatomy and blood supply to it cannot be neglected. It might be well to say that there is a size and shape to the colon for each individual. Many, including myself, rarely will recognize a condition called by some "ptosis" of the colon as being pathologic or, in itself, as being the cause of symptoms.

Because of the anatomic structure of the right half of the colon, it being thin-walled with a larger lumen than the left portion of the colon, as well as because of the fluid nature of its contents, primary resection and primary anastomosis can be done with safety more frequently in this portion of the colon than in other portions. Whenever resection and primary or secondary intraperitoneal anastomosis are performed in the colon, it is well to take advantage of epiploic tags to protect the line of suture, and to make certain that very small stitches or ties are made in order not to strangulate them and give the body more to do in fighting small gangrenous portions of fat. It is well also to take advantage of that great protective mechanism, the omentum, whenever it can be utilized without tension.

The blood supply to the colon arises, in the main, from the left, middle and right colic arteries. They connect in the usual case by means of the marginal artery which runs near the bowel itself, in the mesentery. The marginal vessel is very important, and any anastomosis made without regard to blood supply to the cut edge is doomed, in a high percentage of cases, to failure, and death from leakage and peritonitis will result. Close observation for pulsation, loosening of clamps for purposes of inspection of small bleeding

vessels, notation of color and variations, palpation of vessels, accurate placement of sutures (not too many, so that blood supply will not be minimized to the area in which it is most needed), these are some of the things which constantly must be kept in mind while one section of bowel is being joined to another.

The surgeon who, on operating on the colon, feels that what he does at the time of operation is the complete answer to a rapid and successful outcome is destined to a rude awakening. The best end-results will be obtained by the cooperative efforts of interested medical colleagues who, in my opinion, can play a most important role in the preoperative preparation and postoperative care of the patient.

The objectives to be gained preoperatively are conditioning of the patient for the shock of surgical intervention—and there is always shock of some degree—and making the bowel as clean as possible as rapidly as possible. The measures indicated and the time required to bring this about will, of course, vary with the conditions encountered in each individual case.

Postoperatively, the therapy to be employed makes use of the principle of prevention of complications by anticipating their probable occurrence, and if they occur, despite every effort, of treating each condition properly and quickly. Two postoperative agents I would mention herein as important adjuncts to the surgeon's resources; they are the immediate transfusion of blood after operation and the administration of a high concentration of oxygen. These measures are to be thought of in terms not only of treatment of a complication but also in terms of prevention of a complication. Therefore, after extensive operations, such as combined abdominoperineal resection or resection of the right part of the colon, I carry out a routine plan: regardless of how well a patient is at the conclusion of such an operation, both blood and oxygen are administered.

It is, in the end, the summation of all important details in the preoperative preparation, the operation and the postoperative care that makes for a comfortable convalescence and a happy conclusion in the professional relationship between the physician or surgeon and the patient. The considerate technician and the attentive, thoughtful nurse play their parts, also, in the treatment of the sick.

There are as many methods of performing a particular surgical procedure as there are surgeons doing them. Each surgeon has his small or great prides and prejudices. It is important in the development of a man as a surgeon or as a physician that proper evaluation be maintained by virtue of clinical travel and study. It is an easy

thing to sit back and delay such travel or study from year to year until the practitioner becomes hidebound by a self-induced provincialism.

Do not become fanatical on relatively unimportant details, such as in the use of silk, cotton or catgut. Each has a place, if it is properly made and properly used. Be fanatical on proved important details. Have a reason for every step you use in surgery, and be certain of its practical value, not its theoretical value.

The object of the physician and the surgeon is to get the patient well, if possible, and to get him well as quickly as possible—worthy objectives of a great profession.

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## BOOK REVIEWS

*The Editors of THE SOUTHERN SURGEON will at all times welcome new books in the field of surgery and will acknowledge their receipt in these pages. The Editors do not, however, agree to review all books that have been submitted without solicitation.*

**MANUAL OF STANDARD PRACTICE OF PLASTIC AND MAXILLOFACIAL SURGERY: MILITARY SURGICAL MANUALS**, National Research Council. Prepared and Edited by the Subcommittee on Plastic and Maxillofacial Surgery of the Committee on Surgery of the Division of Medical Sciences of the National Research Council, and Representatives of the Medical Department, U. S. Army. ROBERT H. IVY, Chairman. JOHN STAIGE DAVIS, JOSEPH D. EBY, P. C. LOWERY, FERRIS SMITH, BRIG. GEN. LEIGH C. FAIRBANK, Medical Department, U. S. Army. LT. COL. ROY A. STOUT, Dental Corps, U. S. Army. With Contributions by JOHN SCUDDER and FREDERICK P. HANGEN. 432 pages, with 255 figures. Price, \$5. Philadelphia and London: W. B. Saunders Company, 1942.

Since it's obviously impossible to make each new medical officer an all around specialist, the National Research Council is attempting to meet this need with a series of surgical monographs, of which this is the first. Although the greater part of this one has been prepared by Ferris Smith, one senses that the subcommittee in direct charge of the work shares with him the responsibility for the dogmatism of the book. And when a group of this caliber allows itself to become dogmatic one must believe they have a right to be that way. There is, then, nothing of the dry and dusty historical details of man's attempts to meet surgical problem; the book is not cluttered with a lot of obsolete procedures. A few are damned by way of example, but the book is written primarily to tell you what to do and, sometimes equally important, what *not* to do.

It is emphasized that the purpose of this manual and of those to follow is not to kill initiative, although the surgeon who deviates from the principles laid down and fails to get good results will be held responsible for his failure.

The Military Surgical Manuals promise to be of the greatest value. Subsequent ones will deal with Ophthalmology and Otolaryngology; Abdominal and Genito-Urinary Injuries; Orthopedic Subjects; Burns, Shock, Wound Healing and Vascular Injuries; Thoracic Surgery; and Neurosurgery, and Peripheral Nerve Injuries. One hopes that the future monographs will sustain the high standard set by this one.

**INTESTINAL OBSTRUCTIONS. A PHYSIOLOGICAL and CLINICAL CONSIDERATION with Emphasis on THERAPY; Including DESCRIPTION of OPERATIVE PROCEDURES.** By OWEN H. WANGENSTEEN, B.A., M.D., Ph.D., Professor of Surgery of the University of Minnesota and Surgeon-in-Chief of the University of Minnesota, Hospital. Second edition. 484 pages, with 143 illustrations, of which 82 are newly introduced in this edition. Price, \$7. Springfield, Illinois: Charles C Thomas, Publisher, 1942.

One might well contend that no book in the realm of surgery had done more to influence our understanding of pathologic physiology or to change methods of treatment than the first edition of *The Therapeutic Problems in Bowel Obstruction*: indeed one began to hear of "Wangensteen the patient."

The second edition is in many respects a new book. The original one was the Samuel D. Gross Essay with supplements and embellishments. The new one

has been rearranged and largely rewritten, incorporating new material, both experimental and clinical, from the author's own University of Minnesota and from other institutions, mostly American it is hardly necessary to add.

The subject matter is presented in four sections: 1. The Effects of Obstruction; 2. General Diagnostic Considerations in the Recognition of Bowel Obstruction; 3. General Therapeutic Considerations in its Management, and 4. The Special Obstructions.

While this book is profound enough for the research student, it is above all designed for the practicing surgeon. In the first edition a great deal of space was devoted to the conservative management of certain types of obstruction by the indwelling duodenal tube, which had but recently been introduced. In the new edition the limitations of suction therapy, even by means of the Miller-Abbott tube, are brought out, and greater emphasis is placed on surgery. If operation is necessary, it may be rendered easier by preliminary decompression, but time should not be wasted by persisting in attempts to decompress perfectly. In such cases the problem is to effect the compression by surgical intervention without contamination of the peritoneal cavity. Of course the role of the sulfa drugs and their importance are trotted out, and the indications for the use of plasma.

The book is enthusiastically recommended.

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**THE CARE OF THE AGED (GERIATRICS).** By MALFORD W. THEWLIS, M.D., Attending Specialist, General Medicine, United States Public Health Hospitals, New York City; Attending Physician, South County Hospital, Wakefield, R. I.; Special Consultant, Rhode Island Department of Public Health. Fourth Edition, Thoroughly Revised. 589 pages, with 50 illustrations. Price, \$7. St. Louis: The C. V. Mosby Company, 1942.

The reviewer was astonished that a new edition of this book was necessary within a year of the appearance of the third. Doubtless the chief reason is explained in the preface:

"The census of 1940 shows that there are over 8,956,000 persons over 65 years of age—an increase of 35 per cent over this age group in 1930. There has been an increase of 7.2 per cent in the total population. World War II may cause still greater disproportion between the young and the old."

This edition has been improved in many details. One is inclined to say there is more science, less mythology than in last year's book, but the same amount of art. It will prove really helpful.

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**SYNOPSIS OF ANORECTAL DISEASES.** By LOUIS J. HIRSCHMAN, M.D., F.A.C.S., Ex-Vice President, A.M.A.; Ex-Chairman, Section on Gastro-enterology and Proctology, A.M.A.; Ex-President American Proctologic Society; Chairman, American Board of Proctology, Inc.; Professor of Proctology, Wayne University; Fellow (Honorary) Royal Society of Medicine; Extra-Mural Lecturer on Proctology, Post Graduate School, University of Michigan; Proctologist, Harper, Charles Godwin Jennings, and Woman's Hospitals; etc., etc. 295 pages, with 182 text illustrations and 12 Color Plates. Price, \$4.50. Second Edition. St. Louis: The C. V. Mosby Company, 1942.

The author states that he has stuck to his original intention of producing a synopsis of anorectal diseases which would cover the field well but which would not include fine technical points of diagnosis and treatment where

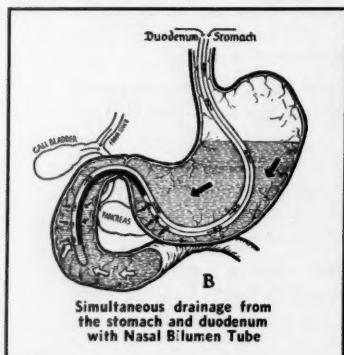
these could be omitted. The book is written both for student and general practitioner. A new chapter has been included on focal infection, a phase of proctology which, he feels, has not received sufficient emphasis in the past.

There is a neat system of presentation of the various topics. The first portion of the book is concerned with anatomy, symptoms referable to the rectum, examination of the patient, anesthesia and office treatment. The remainder is concerned with constipation and obstipation, fecal impaction, pruritus ani, anal fissure and ulcer, abscess of the anorectal region, anal fistula, anal sinus, hemorrhoids, anorectal polyposis, anal papillitis, cryptitis, proctitis and sigmoiditis, foreign bodies, benign growths, rectal stricture, prolapse of the anus and rectum, and focal infection of the anorectal origin. It contains numerous illustrations and color plates.

Procedures necessary in the large majority of anorectal diseases are explained in sufficient detail for the general practitioner with only a limited proctologic practice to make his way with ordinary ease.

An attractive component of the book is a symptom index by which the physician is referred to various disease conditions having possible relationship to the presenting symptoms.

The importance of the chapter on constipation and obstipation has been emphasized by some wag who stated facetiously that half of the men and all of the women are constipated. Although this may be an exaggeration, hundreds of millions of dollars for laxative drugs are spent annually in the United States.



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